Service Manual

SureSight™

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Drawings and/or illustrations and/or part numbers contained in this document are for reference purposes only. For current revisions call the Welch Allyn Customer Service phone number listed in Section 1.

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SECTION 1 GENERAL INFORMATION

1.1 ABOUT THE SURESIGHT PRIMARY CARE MODEL 14001

SureSight is an objective, accurate, affordable vision test that ensures reliable early detection of refractive error, the primary vision disorder in children. Early detection improves outcomes and reduces treatment duration.

1.2 ABOUT THE SURESIGHT AUTOREFRACTOR MODEL 14011

SureSight is a child friendly, portable, affordable autorefractor that lets you test patients - including young children and adults - anytime, anywhere. Carry it from room to room, to your waiting area, even off-site.

1.3 TECHNICAL HELP INFORMATION

All service and repairs must be performed by fully trained and properly equipped personnel, using genuine replacement parts and correct procedures. Failure to do so will invalidate the product warranty and could compromise instrument safety and performance.

Read and understand all safety warnings and service notes printed in this Service Manual and the Operator's Manuals, SureSight part number 140300 and SureSight Autorefractor part number 140400. If in doubt about any precaution or procedure, for phone help, or to order additional copies of the SureSight Operator's Manuals, contact:

Customer Service
Welch Allyn, Inc.
4341 State Street Road, PO Box 220
Skaneateles Falls, NY 13153-0220 USA
Telephone 1-800-535-6663

When calling, refer to the model number shown on data label, found on the bottom of the SureSight.

Troubleshooting assistance is contained in Section 3 of this manual.

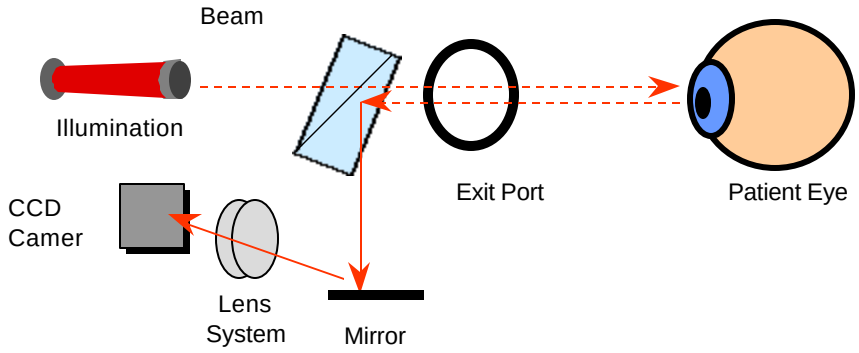
Year 2000 Information: The SureSight is Y2K compliant and will not will not encounter "Year 2000" Problems.

1.4 THEORY OF OPERATION - DETAILS:

Hartmann-Shack Technique Description:

The following is a description of the basic Hartmann-Shack method on which the device is based.

Figure



Light is sent from an illumination source inside the SureSight through a beam splitter and focuses on the back of the eye (retina). The retina, in turn, reflects the light back into the device. Inside the unit, the beam travels through a series of mirrors and is received by a micro-lens array, creating an image which is sent to a CCD camera. The spot pattern of light formed is translated into sphere, cylinder, and axis.

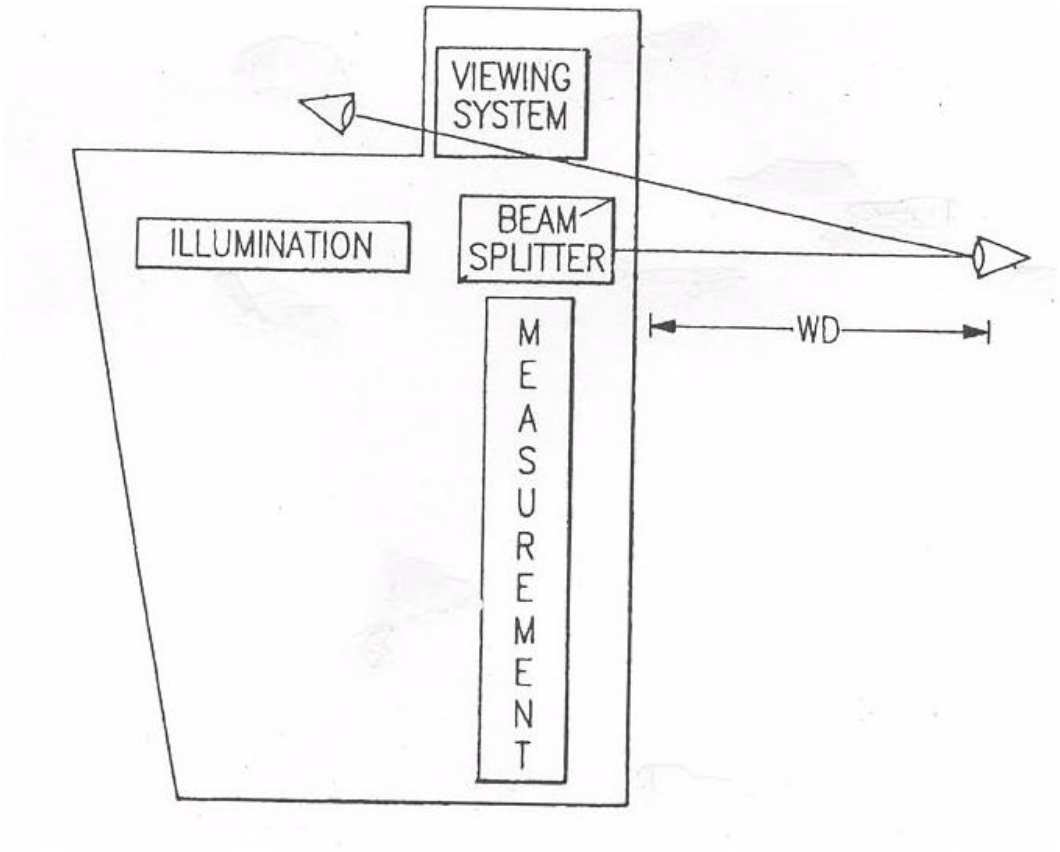
Examples of Spot Pattern Received Through CCD Camera

Emmetropic Eye 0.00 Diopters
spot pattern of light is uniform

Hyperopic Eye +4.24 Diopters
spot pattern of light is compacted

VISION SCREENER OPTICAL SYSTEM ARCHITECTURE

The following is a description of the present design architecture. A collimated beam of light is projected out of the patient port by the illumination system. The light is 'focused" by the eye lens and cornea to a small spot on the retina. This blur acts as a point source on the back of the eye which then radiates back through the eye lens and cornea producing a reflected beam which includes information about the lens power and eye aberrations. The resulting return beam is directed by the beam splitter into the measurement path which is detected by the camera at the end of the path. To achieve alignment, the practitioner views the patient eye and the alignment guide pattern through the viewing system. The working distance between the output port of the device and the patient of approximately 40 centimeters. This large working distance provides the opportunity to improve accuracy in children, as well as being less intimidating to them. It also reduces the need for fogging in which is used in conventional autorefractors which work at approximately 2cm.



MAJOR SUBSYSTEMS:

Illumination System:

The illumination system generates a laser beam which can be projected into the eye under test. Because this laser beam radiates in the infrared region - it is not visible without an IR goggle or other IR detecting device. For repair and calibration purposes, an ITT night vision scope is recommended for any work which includes the illumination system.

The source of illumination is a 5 mW electrical, 3 mW optical semiconductor laser located on the laser mini board. This board is attached to the illumination tube which houses the optics needed to collect the light emitted by the laser and form it into a beam which is projected from the end opposite the laser. The laser mini board is connected via a 4 position flex cable to the laser drive board which controls the laser output. The drive system monitors the laser output with a photodiode which is physically built into the laser diode. The laser drive system controls the laser output to a particular photodiode level which is set by the DSP board. The DSP controls this setting with a digital pot on the laser drive board according to a calibration performed at the factory. This beam is transmitted through the beam splitter located near the one inch port on the front of the unit.

***SAFETY NOTE:** While the laser is capable of emitting 3 mW of optical power, only a fraction exits the illumination tube. Laser levels are controlled to approximately 18 μW, which is well within Class I safety limits. However, to prevent improper exposure DO NOT look at the bare laser diode.

A properly functioning illumination system produces an approximately collimated beam of light 2mm in diameter. This beam can be seen using ITT goggles when a piece of white paper is placed in front of an operating illumination tube. The collimated aspect of the beam can be observed by the lack of change in size of the beam (spot) regardless of the distance from the front of the tube.

Measurement System:

The measurement system detects the beam reflected from the patients eye back toward the unit. This beam enters the product through the one inch port on the front of the unit and is reflected down toward the bottom of the unit by the reflecting side of the beam splitter. This beam passes through a first conjugate lens, to two measurement mirrors which bend the beam across the bottom of the unit and back up toward the top where it passes through a second conjugate lens in to the camera/lenslet assembly. The camera/lenslet assembly consists of the camera board with a lenslet filter mounted to the top of it by a lenslet housing. When the beam passes through this lenslet and IR filter, a group of spots are created which represent the optics of the eye from which the beam came.

The camera image is progressively sent to the DSP board for processing. If a sufficient number and quality of images is detected, the DSP computes and reports a reading of the optical power detected. The exposure, gain and other settings of the camera are controlled by the DSP board through a serial port and a digital pot on the camera board. These settings are also set during the factory calibration.

Viewing System:

The purpose of the viewing system is to create a visible image which can be used to align the product with the patient. Because the laser is invisible, it can not be used for aligning. Instead, the viewing system produces a visible crosshair target which is aligned so as to be in the same position as the invisible laser beam at the in-range working distance. In this way, when the practitioner aligns the crosshair with the patients eye, they are also aligning the laser which is required to make the measurement. It is critical that the viewing crosshair be aligned to the laser beam at the proper working distance.

The source of illumination for the viewing system is an LED located on the LED mini board. This is a traditional LED used to backlight a crosshair which is cut into a cup mounted over the LED. This mini board and cup assembly is mounted to one end of the viewing tube which contains optics required to magnify and project the crosshair to the patients position 40 cm away. The LED mini board is connected to the laser drive board through a 4 position flex cable. The actual drive for the LED is on the laser board and is turned on and off by the DSP using a single control line.

PC BOARD ASSEMBLIES:

DSP Board:

The DSP board includes the microprocessor which controls the operation of the product. It also contains the software in a flash EEPROM, external RAM, a real time clock with battery, and the decoding circuitry for the user button presses. In addition, the DSP board “passes” both power and control signals between boards. All boards are connected to the DSP and all signals and power are redistributed as needed. In other words - any connections which must be made between boards do so through the DSP board.

Power Board:

The power board includes two switching systems to generate all voltages required to operate the product. It includes the charging control circuitry, the low battery circuitry, the distance measurement circuitry, and the speaker/tone generation circuitry.

Fixation Board:

The fixation board includes the fixation LED array which is flashed to attract the patients attention. It also includes the jacks for USB/RS232 connection, and the charging port. The drive circuitry for the RS232 and USB is located on this board, as well as the IRDA sensor which communicates with the printer. In the central section of this board, the ultrasonic sensor is mounted. However, the ultrasonic sensor circuitry is actually on the power board, it only sits on the fixation board to match the output port of the housing.

One important note: the fixation board must be present for the system to power up. If the power board does not sense the presence of the charging jack with no plug present (i.e.: not charging), it will not power up.

Laser Board:

The laser board provides the drive for both the viewing crosshair LED and the laser. The LED is controlled with a simple on/off control at a set output current. The laser is controlled to a target level depending on the setting of the digital pot on this board. The pot is settable by the DSP during each startup of the device. In addition, the laser has an on/off control which is used in addition to the digital pot to insure that the laser is off when not required for measurement.

Camera Board:

The camera board contains a full chipset for the black and white imager which detects the return beam for measurement. The camera exposure control is accomplished via a serial port on the board, and the gain is controlled by a digital pot which is settable by the DSP. The camera gain is subject to calibration at the factory.

LCD:

The LCD is a custom assembly of glass and printed circuit board. In addition to a series of seven segment displays to present the reading results, and various indicators to indicate other conditions, this board includes the button inputs, and the dip switch inputs. Theses are passed to the DSP for detection and decoding.

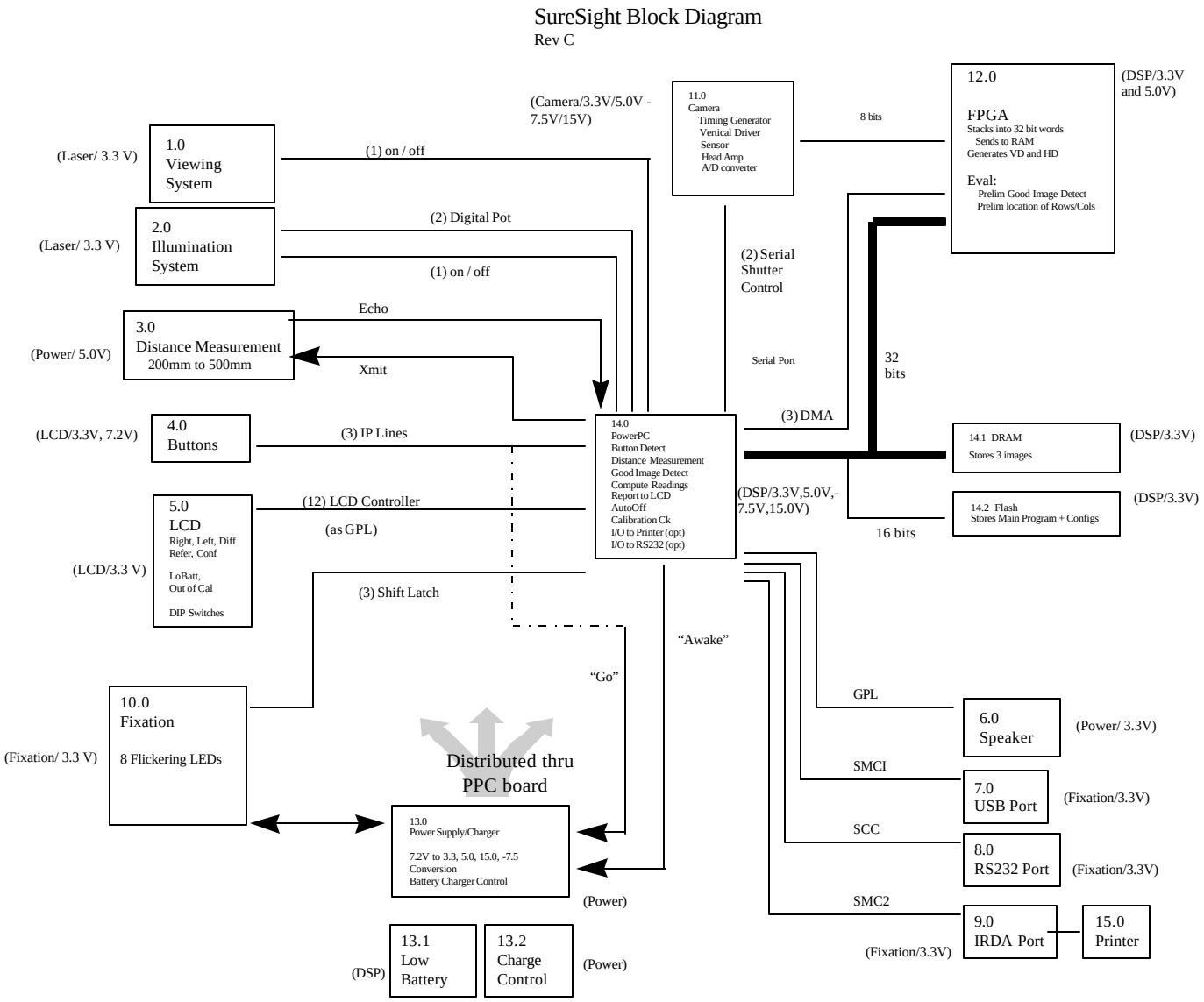
Laser Mini:

The laser mini is a board which is primarily a mechanical mount. The board includes only the laser diode and a flex connector which mates it to the laser drive board via a flex cable.

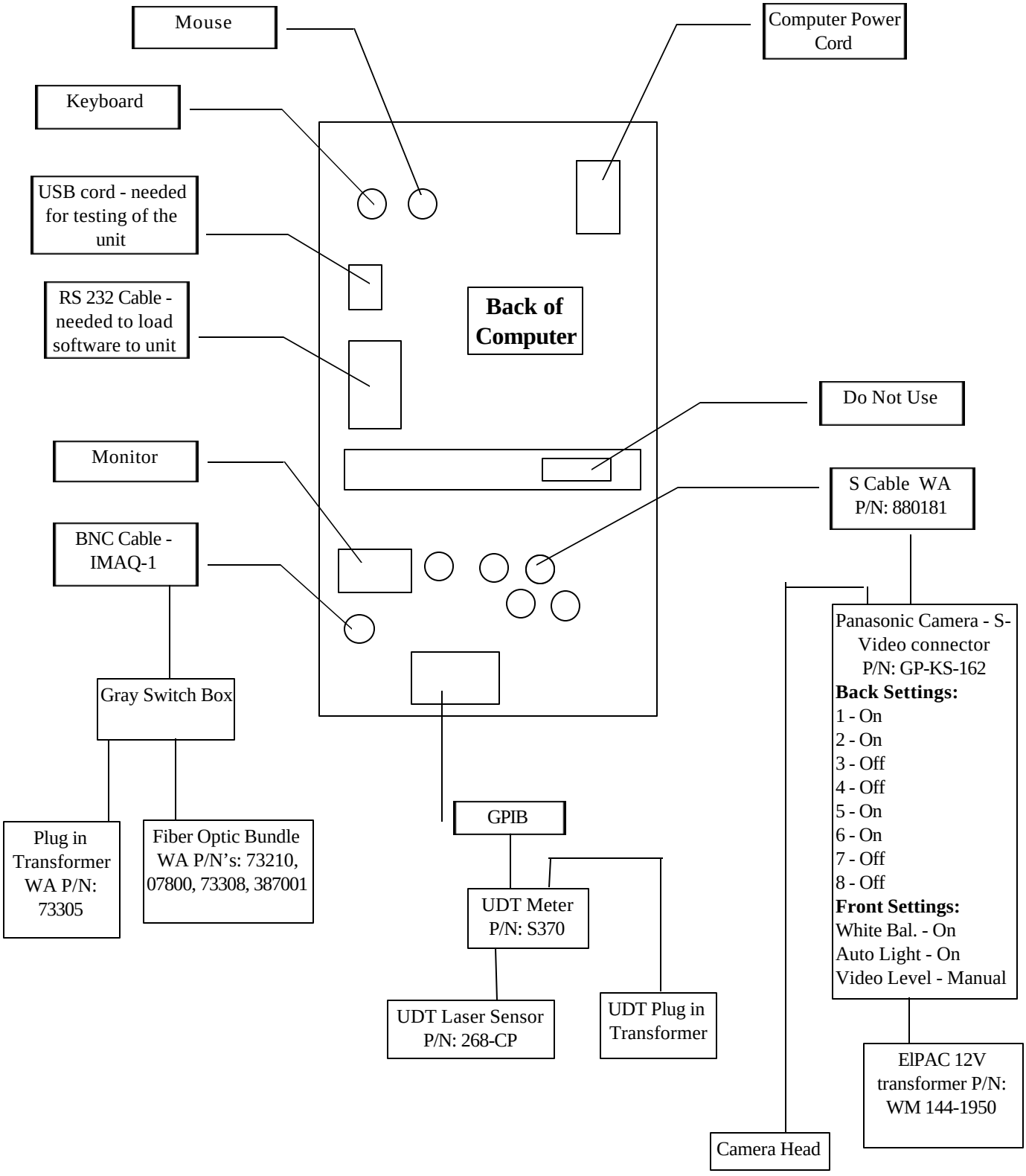
LED Mini:

The LED mini is a board which is primarily a mechanical mount. The board includes only the LED and a flex connector which mates it to the laser drive board via a flex cable.

1.5 BLOCK DIAGRAM

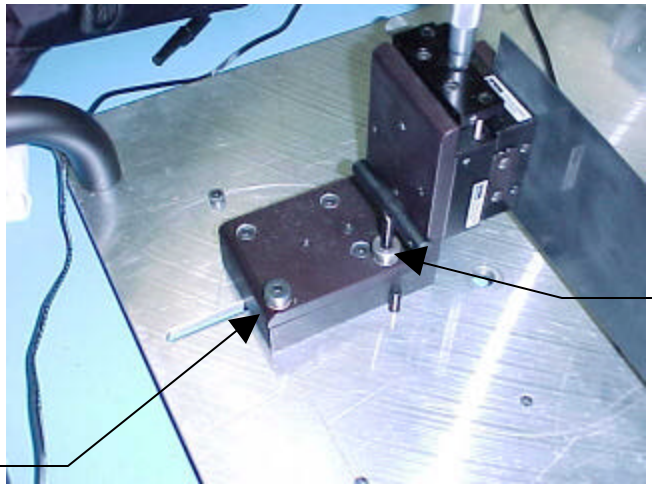


1.5 TOOLING SET UP: WIRE DIAGRAM



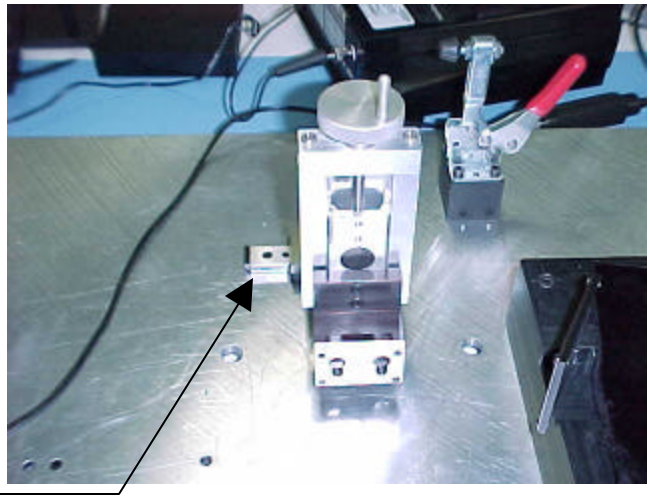
To Set Up Repair Tooling:

1. Connect all wires to computer per provided wire diagram.
2. Plug all plug in transformers to a power strip.
3. Plug the power strip into a step down transformer.
4. Connect the X-Y adjustment laser measurement slide and the Swing eye fixture to the plate. See diagrams below for proper placement.



Place T holder in holder, remove to swing fixture.

Connect swing fixture with bolt.



Connect X-Y Adjustment fixture to plate with 2 screws. There is one screw on each side of the slide.

1.7 WARNINGS

⚠ ATTENTION: Refer to the operating instructions. This symbol (⚠) is intended to advise the user of the presence of important operating or maintenance instructions in the documents accompanying the instrument.

⚠ Service or Repair to be performed by qualified, authorized personnel only. There are no user serviceable parts inside the instrument. Opening this device can expose the user to harmful invisible laser radiation.

⚠ Use only Welch Allyn 710 series chargers.

⚠ Replacement parts and accessories - Use only approved replacement parts and accessories specified in this manual. Refer to the repair parts section of this manual.

⚠ Do not sterilize the instrument or any of its components.

⚠ Use only with IEC 60601-1 approved printers, or keep printer out of patient vicinity.

⚠ Battery replacement: Replace with Welch Allyn model # 72420 Lithium Ion battery only.

⚠ Do not attempt to disassemble or modify the battery pack. There are no user serviceable parts inside the pack.

⚠ Do not attempt to directly solder the battery pack.

⚠ Do not attempt to connect the positive and negative battery terminals to each other, nor to any other device.

⚠ “Caution” - use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

⚠ Do not operate, charge, leave or discard battery pack in any environment where it may exceed 0°C to 40°C.

⚠ Do not immerse the battery pack in water.

⚠ Do not attempt to open or pierce the battery pack.

⚠ Do not throw or strike the battery pack.

⚠ Do not use a battery pack which appears to be deformed, leaking, corroded or is otherwise irregular.

⚠ If electrolyte leaking from battery contacts your skin or eyes, rinse with running water and immediately seek medical attention.

⚠ IPX∅: Not protected against the ingress of water.

⚠ Not for use in the presence of flammable anesthetics.

⚠ ITT Nightscope can not leave Welch Allyn repair facility due to import/export regulations. It is considered a military device.

⚠ When the device is opened, laser emission above the acceptable exposure limit (AEL) may be present. Care must be taken not to look into the beam or project the beam into another person’s eye.

SECTION 2: SERVICE

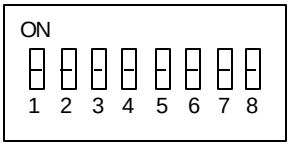
2.1 INCOMING INSPECTION LIST:

When a SureSight Unit is Returned, Check:

1. Physical Condition of Package and Unit

2. Record the following observations:

   - Model #_____
   - S/N found on inside of battery door _____
   - Record Dip Switch Position:



   - Does Instrument Power Up? Yes No
   - Cal Settings as received? Adult Child
   - S/W version as received? _____
   - Distance function check: Pass Fail
   - Gross Alignment Check - Fake eye
   - Cal light symbol: ON OFF
   - Cross Hair Quality: Good Poor

3. Refer to Section 3 - The Customer Complaint and Troubleshooting Guide to localize the problem.

2.2 REQUIRED UPGRADES:

Component to Upgrade	When to Upgrade
Battery Compartment (see section 4.9)	• Always replace when the anti-reverse tabs are absent • Replace compartment if retainer is too tight or too loose
Patient Window	• Replace as needed if scratched • Always replace if before serial #9900594 for 14001 and before serial #9920228 for 14011
O-Ring (see section 4.6)	• Always remove
Power PCB Charger	• Domestically - Change when there is a customer complaint about charge rate in units before 9900480 for 14001 and 9920086 for 14011. • Internationally - N/A
Cross Tubes / Windows	• Always replace if before serial #0000018 for 14001 and before serial #0020093 for 14011
Software (see section 2.4)	• Always upgrade the software to most recent version

SECTION 2.3 TOOLS REQUIRED FOR SERVICE, CALIBRATION AND SOFTWARE LOADING

Table 2.3-1
Tier 1 - Unit Check Out - Yearly Calibration

Tier 1 tooling is the minimum required to equip a site to perform yearly calibrations. This calibration does not require the opening of the unit and primarily verifies the product performance. Software upgrades are feasible with this tooling, but no internal repairs are allowed. Bold part numbers indicate parent items. Non bold items below are included in the parent set.

TIER 1 REQUIRES TOOL SET T17009, WHICH CONSISTS OF THE FOLLOWING:

PART NUMBER	DESCRIPTION	OPTION	NEEDED TO VERIFY
T16936	Tier 1 Plate with Nest, Camera Mounts, Distance Fixture & Target	Required	Alignment Refraction Distance Accuracy
	PC-Windows 98 with USB connector	Required	Unit Information
PCI-1411	National Instrument Capture Card	Required	Software
T17019	SureSight Alignment Check Software	Required	Alignment Verification
778 044-03	IMAQ Vision Run Time License	Required	Alignment Verification
T16729	Final Tester Software	Required	All unit functions
WA part #: 140104-3	USB Cable	Required	Unit Information
WA part #: 140104-2	RS232 Cable	Required	Unit Information
WA part #: 880181	S-Cable	Requires	Unit Information
5370	UDT Meter	Required	Laser level
268CP	UDT Laser Sensor	Required	Laser Level
777154-01	GPIB National Instrument Card	Required	Software
Flash point 128	Flash Point FPG Capture Card	Required	Software
Fluke Model 73	Multimeter	Required	Charge Current
WA Part #'s: 73210, 07800, 73305, 73308	Lighting for Fake Eye w/ fiber-optic bundle	Required	Alignment Verification
WA Part #: 387001	F.O. Illuminator Connector Base	Required	Alignment Verification
Hewlett Packard 82240B	SureSight Printer	Required	Print capability & s/w version
Panasonic GP-KS-162	Camera, cable and controls	Required	Images
Panasonic GP-LM24TA	Lens	Required	Images
IMAQ-1	BNC Cable	Required	Alignment Verification
T17162	Gray Switch Box	Required	Alignment Verification
T17164	Charge Box	Required	Charge Current
WA Part #: 73305	Plug in Transformer	Required	Alignment Verification
WM 144-1950	12 V transformer	Required	Images
T16545	Fake Eye (0)	Required	Calibration
TI6934	Fake Eye Set	Required	Refractive Reading Accuracy
T17008	Night Vision Scope - Version 2	Required	Laser Level
WA part #: 140381	Hand Strap Replacement Tool	Required	Replace Hand Strap
TI6556	Nest	Required	

NOTE: REPAIR STATIONS WILL BE REQUIRED TO HAVE A STEP DOWN TRANSFORMER

Table 2.3-2
Tier 2: Unit Repairs - Major Systems

Tier 2 tooling is required to equip a site to perform internal repairs. These repairs are limited to major subsystems. Component level repair is not available for this product. Bold part numbers indicate parent items. Non bold items below are included in the parent set.

Tier 2 requires Tool Set T17010, which consists of the following:

PART NUMBER	DESCRIPTION	OPTION	NEEDED TO VERIFY
T16936	Tier 1 Plate with Nest, Camera Mounts, Distance Fixture & Target	Required	Alignment Refraction Distance Accuracy
	PC-Windows 98 with USB connector	Required	Unit Information
PCI-1411	National Instrument Capture Card	Required	Software
T17019	SureSight Alignment Check Software	Required	Alignment Verification
778 044-03	IMAQ Vision Run Time License	Required	Alignment Verification
T16729	Final Tester Software	Required	All unit functions
WA part #: 140104-3	USB Cable	Required	Unit Information
WA part #: 140104-2	232 Cable	Required	Unit Information
WA part #: 880181	S-Cable	Requires	Unit Information
5370	UDT Meter	Required	Laser level
268CP	UDT Laser Sensor	Required	Laser Level
777154-01	GPIB National Instrument Card	Required	Software
Flash point 128	Flash Point FPG Capture Card	Required	Software
Fluke Model 73	Multimeter	Required	Charge Current
WA Part #'s: 73210, 07800, 73305, 73308	Lighting for Fake Eye w/ fiber-optic bundle	Required	Alignment Verification
WA Part #: 387001	F.O. Illuminator Connector Base	Required	Alignment Verification
Hewlett Packard 82240B	SureSight Printer	Required	Print capability & s/w version
Panasonic GP-KS-162	Camera, cable and controls	Required	Images
Panasonic GP-LM24TA	Lens	Required	Images
IMAQ-1	BNC Cable	Required	Alignment Verification
T17162	Gray Switch Box	Required	Alignment Verification
T17164	Charge Box	Required	Charge Current
WA Part #: 73305	Plug in Transformer	Required	Alignment Verification
WM 144-1950	12 V transformer	Required	Images
T16545	Fake Eye (0)	Required	Calibration
TI6934	Fake Eye Set	Required	Refractive Reading Accuracy
T17008	Night Vision Scope - Version 2	Required	Laser Level
WA part #: 140381	Hand Strap Replacement Tool	Required	Replace Hand Strap
TI6556	Nest	Required	
T1562-23	1.5 - 2.0 in-lb. Torque Driver*	Required	Attachment
	Phillips Bit for #4 screw 1 5/16" length Point Size - 1	Required	Attachment
T1562-12	2.75 - 3.75 in-lb. Torque Driver*	Required	Attachment
	Phillips Bit for #4 screw 1 5/16" length Point Size - 1	Required	Attachment
T1562-12	3.5 - 4.5 in-lb. Torque Driver*	Required	Attachment
	Phillips bit for #6 screw 2 ½ " length Point Size - 2	Required	Attachment
T1562-12	5.5 - 7.5 in-lb. Torque Driver*	Required	Attachment
	Torx Bit T-20	Required	Attachment
T16541	Baseplate Support Fixture Top	Required	Main assembly repairs
T16542	Baseplate Support Fixture Bottom	Required	Main assembly repairs

NOTE: REPAIR STATIONS WILL BE REQUIRED TO HAVE A STEP DOWN TRANSFORMER
***NOTE: PROPER TORQUES ARE CRITICAL TO FUNCTION. DO NOT HAND TIGHTEN WITHOUT TORQUE METER OR DRIVER.**

2.4 CALIBRATION CHECK:

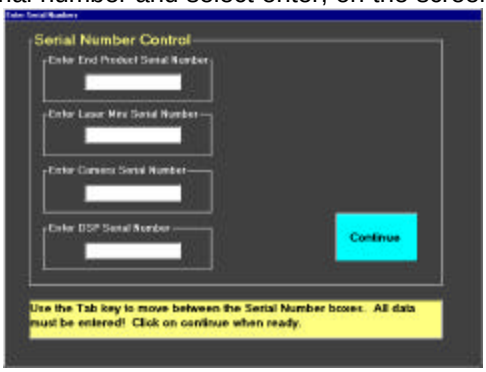
2.4.1 Before starting the software make sure all dip switches are in the off position.

2.4.2 Start up software

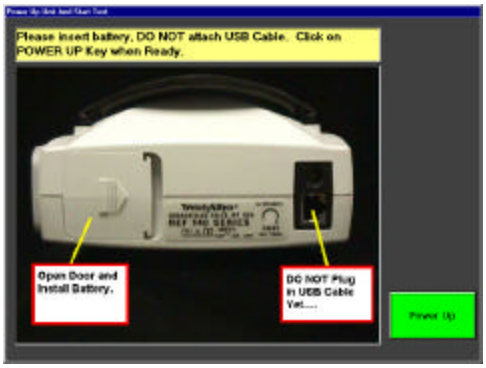
2.4.3 Place unit in nest, follow instructions on the screen.

Welch Allyn SureSight
Run Test
Start
Exit Test
Exit Test
Technical Menu
Individual Tests
> Make sure the test nest is in the front position.
> Please have all serial numbers ready before you start testing.
> When ready, click on the option you want.

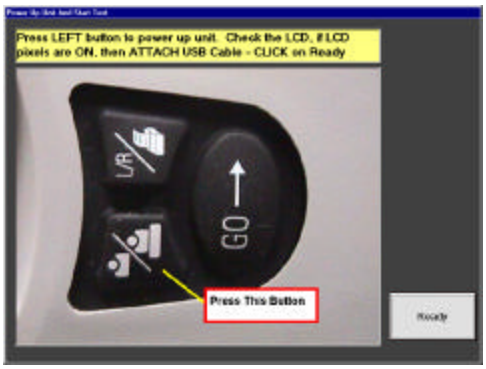
2.4.4 Enter the product serial number and select enter, on the screen.


Serial Number Control
Enter End Product Serial Number
Enter Laser Mini Serial Number
Enter Camera Serial Number
Enter DSP Serial Number
Continue
Use the Tab key to move between the Serial Number boxes. All data must be entered! Click on continue when ready.

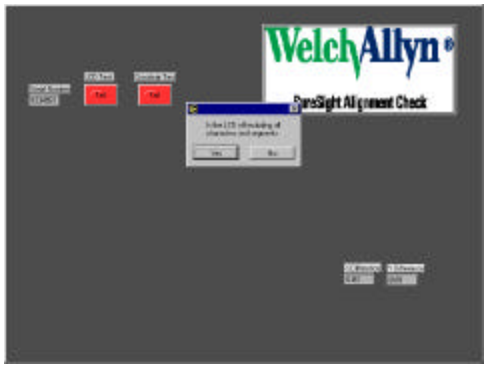
2.4.5 Insert battery and follow instructions on the screen.

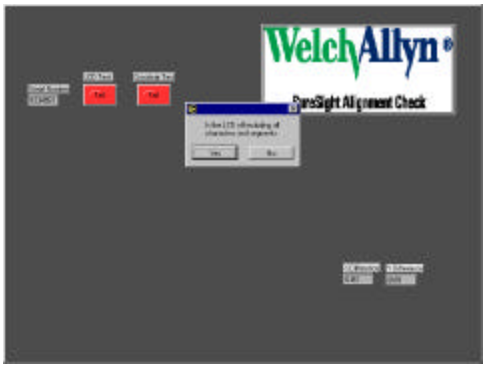

Please insert battery, DO NOT attach USB Cable. Click on POWER UP Key when Ready.
Open Door and Install Battery.
DO NOT Plug in USB Cable Yet....

2.4.6 Press the child adult button, ensure the unit powers up, and plug in USB. Follow instructions on the screen.

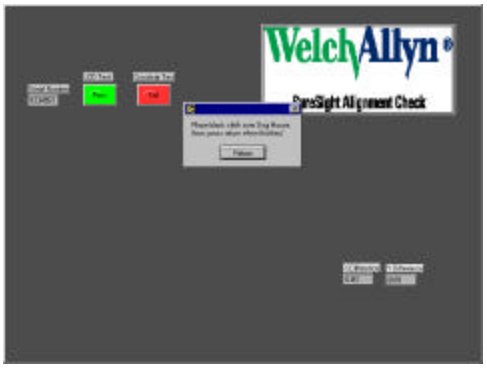

Press LEFT button to power up unit. Check the LCD. If LCD pixels are ON, then ATTACH USB Cable - CLICK on Ready
GO
Press This Button
Ready

2.4.7 The software will flip through some more screens and stop at the LCD screen. Check to see if the LCD's are on and follow instructions on the screen. Then check to see if they are off and follow instructions on the screen.



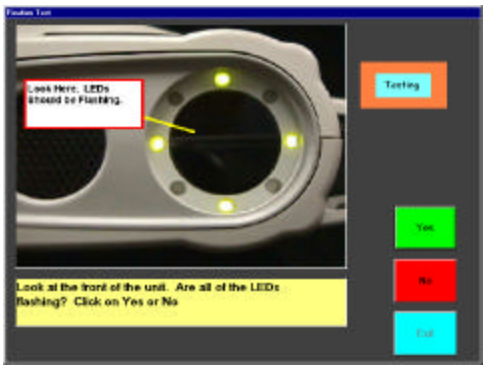


2.4.8 After the LCD check, the program will prompt you to place the black cloth over the dog house. Follow instructions on the screen.

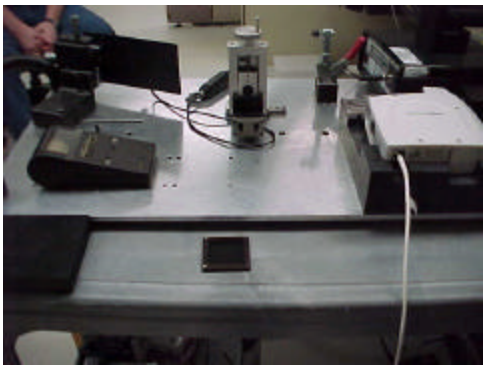


2.4.9 Check screen for crosshair and follow instructions on the screen.

2.4.10 Remove the black cloth from the dog house and follow instructions on the screen.



2.4.11 Place the printer in front of the unit. (see **Figure 1 - Printer position**) Follow instructions on the screen.



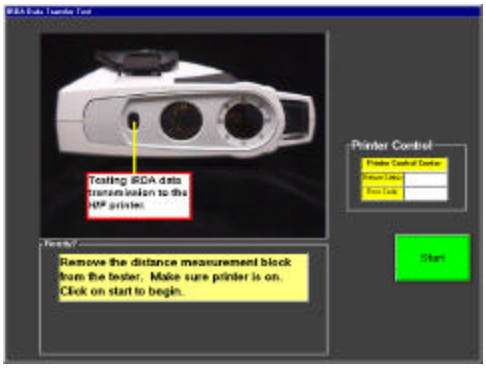
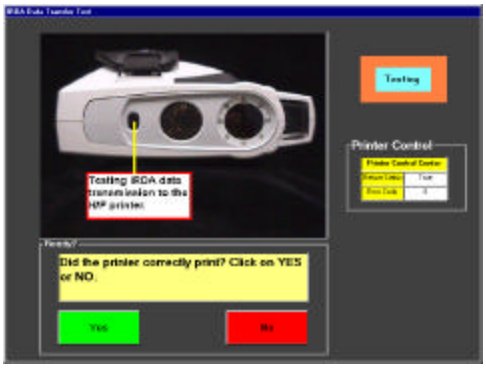


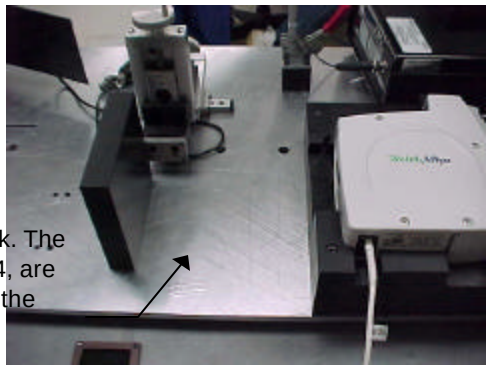
Figure 1 - Printer position

2.4.12 Follow instructions on the screen.



2.4.13 The following screens will prompt you to place the distance block in the subsequent positions. The positions for the distance block are marked on the plate. Follow instructions on the screen. The screens will change to let you know when to move the distance block to the next position.

Distance block. The positions, 1-4, are marked on the plate.



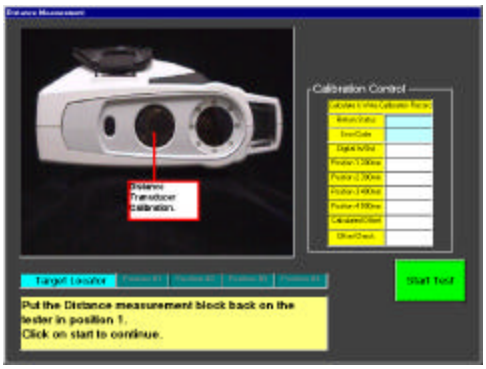
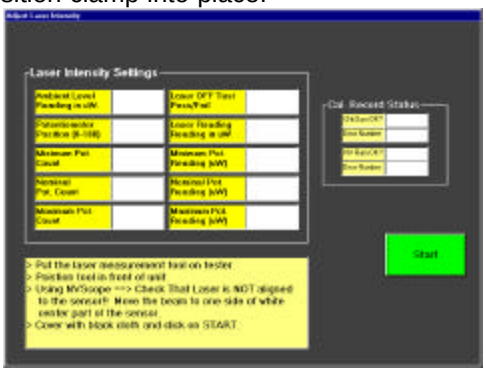

Calibration Control
Distance Transducer Calibration
Target Location
Start Test
Put the Distance measurement block back on the tester in position 1.
Click on start to continue.

Figure 2 - Distance block position

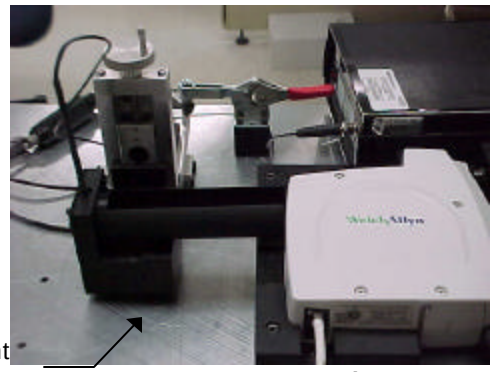
2.4.14 After the distance for position 4 is taken, leave the distance block in that position for the next operation. The next screen will prompt you to press start, **YOU DO NOT NEED TO DO THIS IT WILL START AUTOMATICALLY**. Once the test is done the next screen will appear.

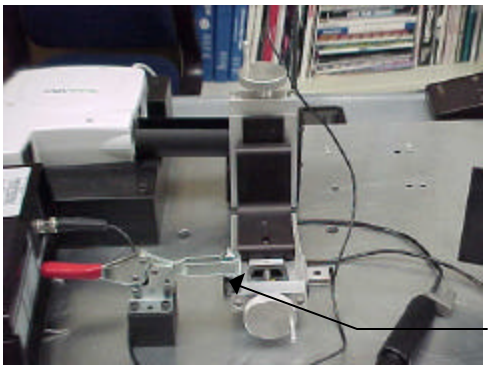
2.4.15 The next three screens will prompt you to press a certain button, follow the instructions on the screens. Once you press the button the screen will change to show you which button to press next. The last button is the go button. Once you press this it will start to take a reading, hold the go button in until it stops.

2.4.16 The next screen prompts you to place the laser measurement tool in front of the unit. Once this in the correct position clamp into place.



Laser Measurement Tool





Clamp tool down, when in proper place.

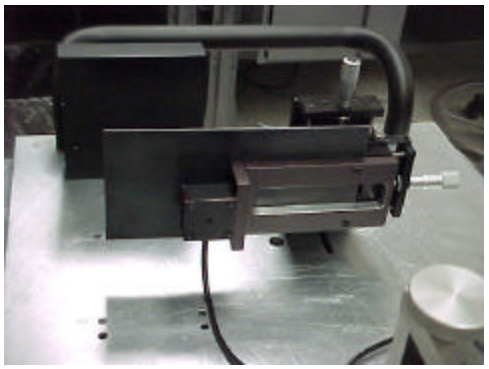
Figure 3 - Laser Measurement Tool

2.4.17 Once the fixtures are in place use the NV scope to see the position on the laser. Make sure the laser is **NOT** aligned with the sensor. Follow instructions on the screen.

2.4.18 Cover the dog house with the black cloth and follow instructions on the screen.

2.4.19 When prompted to, use the NV scope to align the laser with the sensor. Cover unit and follow instructions on the screen.

2.4.20 Remove the laser measurement tool and then place the 0.6 ND filter on tester and make sure the swing eye fixture is positioned in front of the unit.



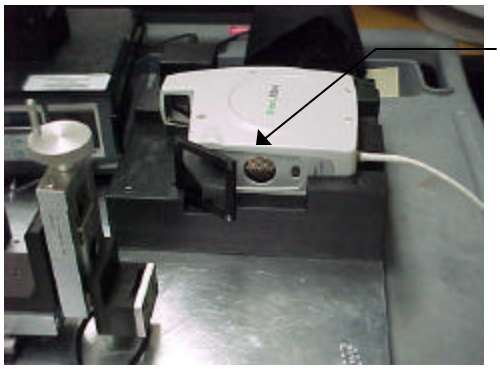
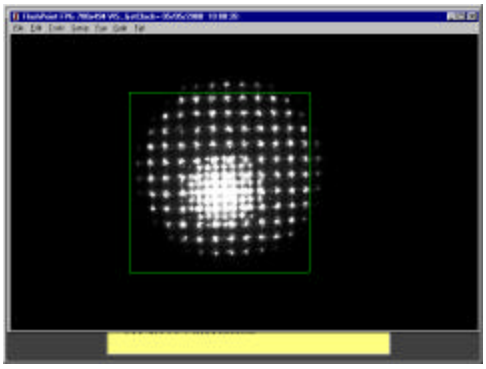


Figure 4 - Swing Eye Fixture and ND filter

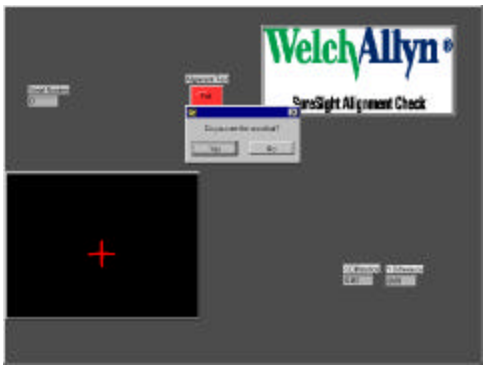
2.4.21 Click on align laser. This will bring up the flash point screen with the camera image. Find the max. glare by moving the knobs on the swing eye fixture. Once this is found select exit on the flash point screen.

Laser Alignment
Align Laser
> Leave 0.6 ND Filter on tester.
> Click on Align Laser to set the laser to the center of the fake eye.
> Align the laser for maximum glare. Use the X-Y movement.

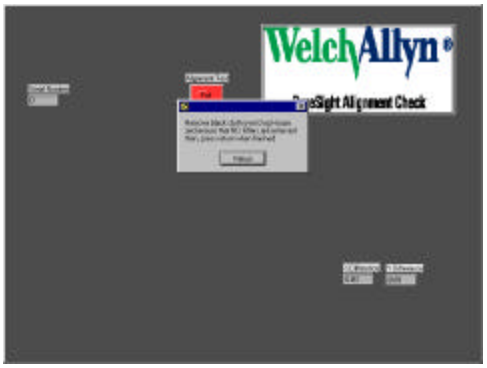


2.4.22 The next screen will prompt you to place the black cloth over the dog house.

2.4.23 Check for crosshair and follow instructions on the screen.



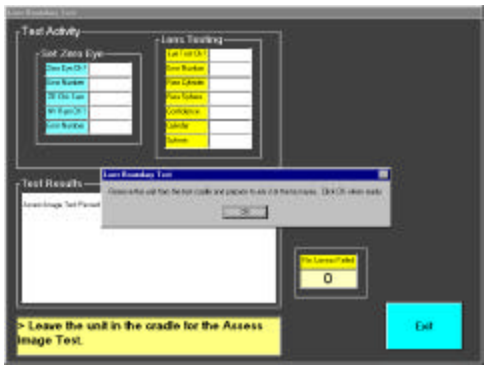
2.4.24 The next screen will prompt you to remove the black cloth, **LEAVE THE BLACK CLOTH ON THE UNIT BUT MAKE SURE IT DOES NOT BLOCK THE FRONT OF THE DOG HOUSE**. Follow instructions on the screen.

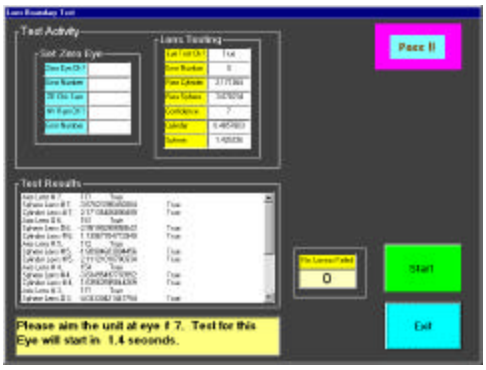


2.4.25 Check for pupil and follow instructions on the screen.

2.4.26 Remove the black cloth and place the ND filter back on the nest. Follow instructions on the screen.

2.4.27 Follow instructions on the screen. When you remove the unit from the nest, keep the USB connected.

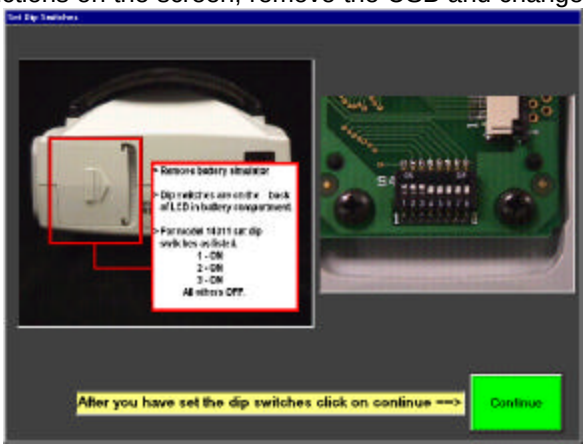




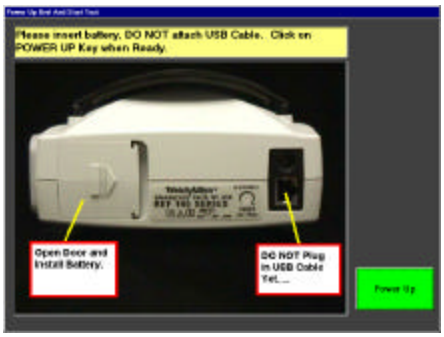
2.4.28 Starting with the -2 diopter, take one reading from each of the fake eyes, on the rack of eyes.

2.4.29 **IF THIS IS A PRIMARY CARE UNIT THIS WILL BE THE END OF THE AUTOMATED TEST. Reset DIP Switches to their original position and proceed to step 2.4.34.** The following steps are only for **EYECARE UNITS.**

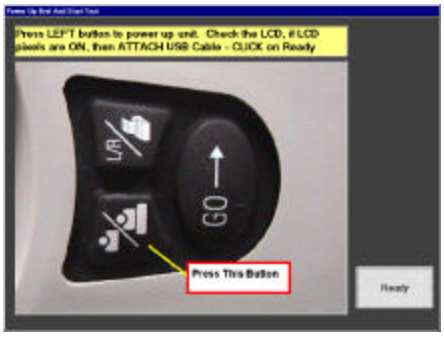
2.4.30 Follow the instructions on the screen, remove the USB and change the DIP switch settings.



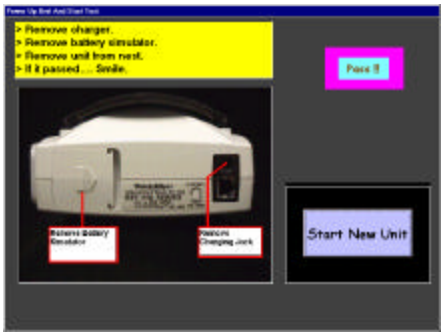
2.4.31 Follow instructions on the screen and replace the battery.


Please insert battery, DO NOT attach USB Cable. Click on POWER UP Key when Ready.
Open Door and Install Battery.
DO NOT Plug in USB Cable Yet....
Power Up

2.4.32 Follow instructions on the screen and turn unit on and connect the USB.


Press LEFT button to power up unit. Check the LCD, if LCD pixels are ON, then ATTACH USB Cable - CLICK on Ready
GO
Press This Button
Ready

2.4.33 **THIS IS THE END OF THE AUTOMATED TEST.**



2.4.34 Check the charge current of the unit once it has completed the calibration test.

- Insert a discharged or moderately charged battery into the unit under test.
- Connect the 71040 to the charger box IN.
- Connect the extender cable from the charger box OUT to the unit jack.
- Connect the Fluke 73 multimeter to the two jacks on the charge box.
  Note: this is the only multimeter allowed to check the charge current.
  - Positive lead goes to 10 A
  - Negative lead goes to COM
  - Set meter at D/C Amps
- Read the current
  - The current should read between: 40 mA - 162 mA
- **Note: A fully topped off battery may trigger the shutdown circuitry of the charge system. If the current reads low, it should be verified with a second battery before replacement.**

2.4.35 Check for aesthetics. If there are any fingerprints on housings or windows, properly clean them off.

2.5 SOFTWARE UPGRADE

2.5.1 Make certain the Sure Sight unit is off.

2.5.2 Connect the RS232 Cable (Phone Jack) to the SureSight and RS232 Cable (9 - pin connector) to the PC COM port.

2.5.3 ***Upgrade using MS DOS***:

2.5.3.1 Insert the SureSight Software Update floppy in the floppy drive. Open up an MSDOS window and type "**A:**" (without the quotations) to switch to the floppy directory and type **SETUP**.

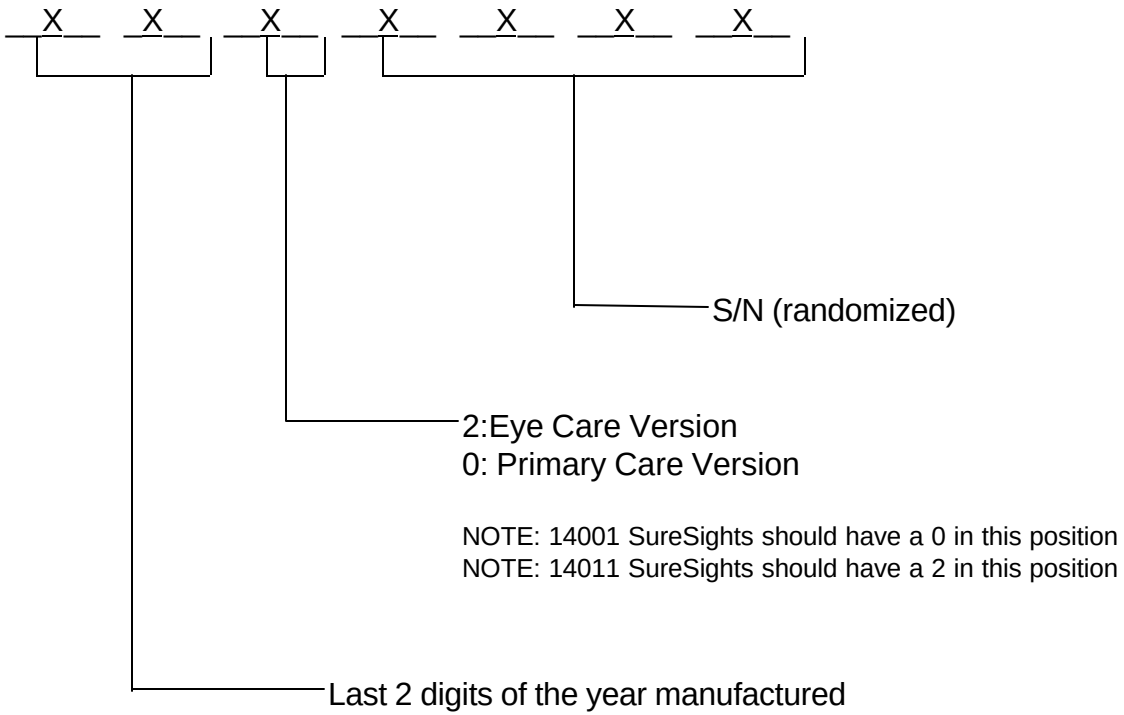
2.5.3.2 The setup script will prompt you for a COM port (1 or 2) and tell you when to power on the unit. The progress on the upgrade is given and "Software update completed successfully!", should be shown after the update is completed.

2.5.4 ***Upgrade Using Windows 95 / 98:***

2.5.4.1 Insert the SureSight Software Update floppy in the floppy drive. Click on the Start button and then click on Run. Type **A:SETUP** and click on OK.

2.5.4.2 The setup script will prompt you for a COM port (1 or 2) and tell you when to power on the unit. The progress on the upgrade is given and "Software update completed successfully!" should be shown after the update is completed.

2.6 PRODUCT NUMBERING STRUCTURE/ SERIAL NUMBERING STRUCTURE


X X X X X X X
S/N (randomized)
2:Eye Care Version
0: Primary Care Version
NOTE: 14001 SureSights should have a 0 in this position
NOTE: 14011 SureSights should have a 2 in this position
Last 2 digits of the year manufactured

2.7 REPAIR PARTS LIST

Part Number	Description	Bubble Number	Qty.
M11052	9 X 12 POLY BAG		1
V140170-120	TARGET SW VER 1.20		1
106100-2	PHPS 2-56 X .187		4
106100-42	4-40 X .25 SCREW		3
140071-30-1750	FLEX CABLE, .5MM PITCH		1
140073-04-1500	FLEX CABLE, 1.00MM PITCH		2
140127-501	FRONT INSERT SUB ASSEMBLY		1
140129-501	BASE PLATE SUB ASSEMBLY		1
236992	IC, SNAPHAT FOR M48T559Y		
536000	ROLL OF PAPER		1
72420	LI ION BATTERY		1
140126-501	BATTERY COMPARTMENT SUB ASSEMBLY	0007	1
106102-27	FHPHPS 6 X 32 X .250	0015	18
106124-4	#4 X .250 LG PPHS SELF TPG	0028	8
140020-3	LCD INSERT	0029	1
140103-2	TAPE, DR SIDE WINDOW	0030	1
140040	WINDOW, DOCTOR	0031	1
140041-501	LCD ASSEMBLY	0033	1
140071-30-2500	FLEX CABLE, .5MM PITCH	0034	1
140280-504	POWER PCB ASSY - PATT X9	0036	1
106100-42	4-40 X .25 SCREW	0037	14
140071-30-4375	FLEX CABLE, .5MM PITCH	0038	1
106102-7	FLAT HEAD SCREW	0040	2
106100-5	PHPS 6-32 X .25	0042	3
140071-08-3375	FLEX CABLE, .5MM PITCH	0043	1
140250-503	DSP PCB ASSY PATT X8	0044	1
140077-3	HAND STRAP, WRDMK GRAY, 5.125L	0045	1
140130-501	TOP HOUSING SUB ASSY	0046	1
140072	BUMPERS	0048	4
140074-3	BOOT	0046	1
140146-1	WINDOW, PATIENT SIDE	0050	1
140068	PATIENT WINDOW U-CHANNEL	0051	1
M11478	PARTS LABEL	0052	1
140022-2	BATTERY DOOR	0053	1
140090	HINGE PIN	0054	1
140131-501	BOTTOM HOUSING SUB ASSY	0056	1
106100-53	PHPS 8-32 X .312	0058	4
140032	DANGER TAG	0059	1
140167	BATTERY FOAM	0062	1
140168	LASER, FOAM	0064	1
M11416	TAPE, KAPTON	0066	

Section 3: SureSight Troubleshooting Guide

This guide should be used for phone personnel as well as by repair technicians to facilitate quick diagnosis of problems

Chief Complaint	Cause	Look For	Customer Corrective Action	Repair Technician Corrective Action
Does Not Power up	Battery not charged	a) Verify battery is installed correctly (orientation) in device and battery retainer is latched over battery. See label and arrow on battery indicating direction of proper insertion. Early versions do not have the battery rib to prevent mis-insertion. b) Check for constant or blinking battery symbol on the LCD. Constant = no charge. Blinking = ~10 to 15 minutes of charge left.	a) Install battery correctly per label. b) Charge battery overnight in stand with 71040. c) Return unit for repair.	a) Verify the Charge Current b) Check to see if flexes are connected, connect if not. c) Replace LCD Assembly and/or flex. d) Replace battery compartment. e) Replace Power Board. f) Replace DSP Board.
No LCD Display	No Data stored in memory	a) Ensure that test was taken within last 5 minutes, otherwise data is not stored.	a) Retake test b) Note version 1.09 software and higher. If it is a lower version send unit in to repair to upgrade. c) Return Unit for repair	a) Check to see if flexes are connected, connect if not. b) Replace LCD Assembly and/or flex
No LCD Display	Defective LCD	a) Ensure that test was taken within last 5 minutes, otherwise data is not stored.	a) Retake test b) Note version 1.09 software and higher. If it is a lower version send unit in to repair to upgrade. c) Return Unit for repair	c) Check to see if flexes are connected, connect if not. a) Replace LCD Assembly and/or flex

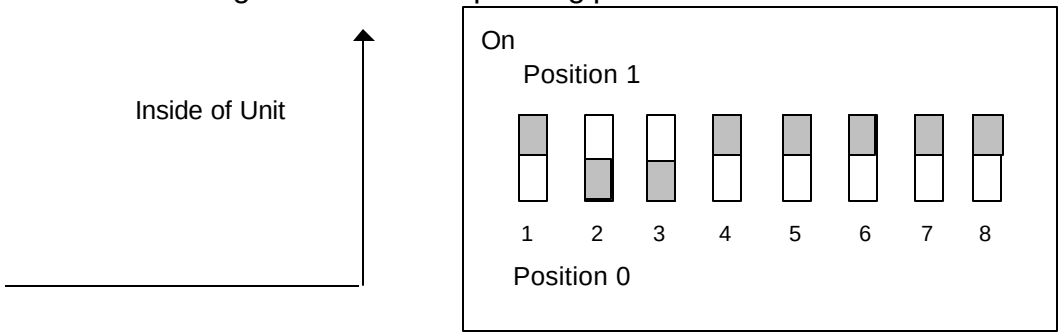
Chief Complaint	Cause	Look For	Customer Corrective Action	Repair Technician Corrective Action
Does Not Print	Printing too far	a) Ensure printer is turned on. b) Ensure that the print button is held until the "ta-da" is heard c) Ensure the unit is aimed at the front of the printer. d) Try printing within 3 feet of printer	a) Retry printing b) Replace batteries in printer c) Return unit for repair	a) Check to see if flexes are connected, connect if not. b) Replace Front Insert Assembly. **NOTE:** Wire Harness must be replaced if Front Insert Assembly is replaced.
Does Not Print	Printer has gone to "sleep"	a) Check to see if red LED is lit in the front.	a) Press feed (right most button) to wake printer up. b) Return unit for repair.	a) Check to see if flexes are connected, connect if not. b) Replace Front Insert Assembly. **NOTE:** Wire Harness must be replaced if Front Insert Assembly is replaced.
Prints too light	Print darkness setting is set too light	a) Try sliding the center contrast switch to the right. b) Try self-test on printer to see if the batteries are low; refer to printer manual pg. 14	a) Reset to roughly center of range. Printer can be used at higher or lower settings if customer desires. b) Replace batteries c) Return unit to Hewlett Packard for repair.	
No Cross-Hair	Defective LED Mini board or electrical failure	a) Ensure battery is charged. b) Ensure battery is installed and turned on. c) Look through peephole and identify Crosshair.	d) Return unit for repair.	a) Check to see if flexes are connected, connect if not. b) Inspect to see if green LED lights **c)** Replace Tubes with PC Sub-Assembly - **WA In-House Only** d) Replace baseplate assembly

Chief Complaint	Cause	Look For	Customer Corrective Action	Repair Technician Corrective Action
Unit is not aligned	Unit dropped or Impacted beyond shock level provided	a) Crosshair is in patients pupil and in range distance is constant but no images are being taken b) Search around eye for "sweet spot" c) Ensure that doctor and patient are at same height, squared and level with each other.	a) Return unit for repair.	a) Check Tube with PC Assembly. May need to shake to see if there is aperture movement. If there is replace tubes with PC Assembly. **WA In-House Only** b) Replace Aligned Base-plate Assembly.
No Reading	Incorrect Distance	a) Adjust distance until constant tone b) If unit cannot obtain constant tone, send in for repair.	a) Return unit for repair	a) If O-ring exists, remove it. b) Replace Front Insert Assembly **NOTE: Wire Harness must be replaced if Front Insert is replaced** c) Replace Power board.
No Reading	Unit misaligned	Refer to Unit is not aligned		
Low Reading	Unit misaligned	a) Ensure level test with patient b) Ensure unit is on proper calibration (adult / child) c) Verify room lighting / not direct lighting d) Verify confidence readings are 6 or higher e) Verify that readings are within .5 D typ.	a) Retest patient level with unit b) Turn down room lights c) verify adult / child calibration d) Verify S/W version e) Return unit for repair	Refer to Unit is not aligned
High Reading	Unit misaligned	a) Ensure level test with patient b) Ensure unit is on proper calibration (adult / child) c) Verify room lighting / not direct lighting d) Verify confidence readings are 6 or higher e) Verify that readings are within .5 D typ.	a) Retest patient level with unit b) Turn down room lights c) verify adult / child calibration d) Verify S/W version e) Return unit for repair	Refer to Unit is not aligned

Chief Complaint	Cause	Look For	Customer Corrective Action	Repair Technician Corrective Action
Buttons not functioning	Electrical or Mechanical failure	a) Verify button press performs correct function b) Ensure battery symbol is not lit.	a) Return unit for repair	a) Replace LCD Assembly
Unit not giving referral criteria - *'s	Wrong calibration	a) Ensure unit is on proper calibration (adult / child). SureSight will only refer on child calibration.	a) Change calibration as appropriate b) Return unit for repair.	a) Calibrate unit
Crosshair not visible	Flex connector loose	a) Ensure battery in installed and turned on. b) Press Go button c) Verify no Crosshair	a) Return for repair	a) Check to see if flexes are connected, connect if not.
Red LED not visible	Flex connector loose	a) Ensure battery in installed and turned on. b) Press Go button c) Verify no LED	b) Return for repair	a) Check to see if flexes are connected, connect if not.
Unit has low speaker	Foam over speaker on power board	d) Foam is placed directly over speaker in production	a) Return unit for repair	a) Place foam in proper position.
Unit does not charge	Power problem	a) Verify battery is inserted in proper orientation b) Verify battery was not inserted in reversed orientation in that the battery would crush the contacts down thus allowing intermittent contact. c) Verify battery contact has sufficient tension on the battery. Determined by letting the battery retainer freely rotate by gravity alone, when properly engaged over a battery. Retainer should not move when a battery is in place.	a) Bend contacts up to normal position with dental pick. b) Return unit for repair of the battery compartment sub assembly.	a) Replace power Board Assembly b) Replace Front Insert Assembly. **NOTE:** Wire Harness must be replaced if Front Insert Assembly is replaced.
Eye Care Unit does not Show Axis	Dip switches are at the wrong settings	a) Make sure the dip switches are set correctly: Refer to the Device configuration table below	a) Set dip switches to the correct setting. b) Send Unit in for repair.	a) Replace the LCD Assembly b) Replace the DSP Board

DEVICE CONFIGURATION TABLE:

SureSight performance is controlled by the type of instrument (Primary Care Unit or Eye Care Unit), the dip switches accessible through the battery compartment, located underneath the battery compartment on the LCD board (see figure below) and the Adult Child Mode button (located on the LCD Display). The following table and diagrams show the combinations of settings and the corresponding performance it determines.



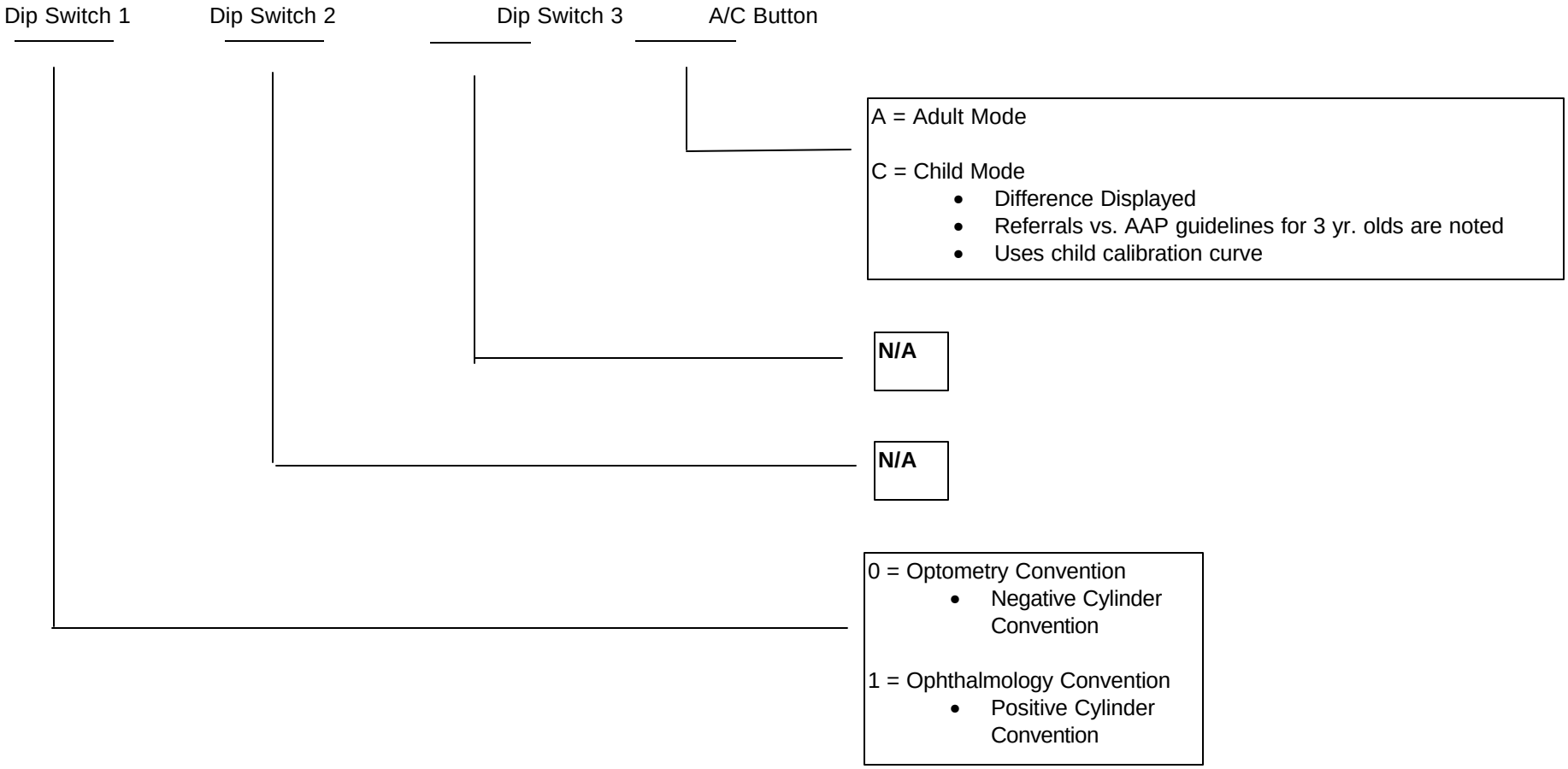
There are a total of 8 dip switches, but only the first 3 are used. Each are labeled with their corresponding number.

Push in to switch to Position 1 and Pull out to switch to Position 0.

Unit Type	Dip Switch 1 Setting	Dip Switch 2 Setting	Dip Switch 3 Setting	A/C Button Setting	Resolution of Reading Displayed	Axis Displayed	Cylinder Convention	Difference Displayed	Range (min. Sphere)	Referrals Marked with *	Resolution of Reading Computed
Primary Care	0 = Opt	N/A	N/A	Adult	10	No	Negative	No	-4.5	No	1/4
		N/A	N/A	Child	10	No	Negative	Yes	-4.5	Yes	1/4
	1 = Oph	N/A	N/A	Adult	10	No	Positive	No	-4.5	No	1/4
		N/A	N/A	Child	10	No	Positive	Yes	-4.5	Yes	1/4
Eye Care	0 = Opt	0 = Std	0 = 1/4	Adult	100	Yes	Negative	No	-5	No	1/4
			1 = 1/8	Adult	100	Yes	Negative	No	-5	No	1/8
			0 = 1/4	Child	100	Yes	Negative	No	-5	No	1/4
			1 = 1/8	Child	100	Yes	Negative	No	-5	No	1/8
		1 = Scr	N/A	Adult	10	No	Negative	No	-5	No	1/4
			N/A	Child	10	No	Negative	Yes	-5	Yes	1/4
	1 = Oph	0 = Std	0 = 1/4	Adult	100	Yes	Positive	No	-5	No	1/4
			1 = 1/8	Adult	100	Yes	Positive	No	-5	No	1/8
			0 = 1/4	Child	100	Yes	Positive	No	-5	No	1/4

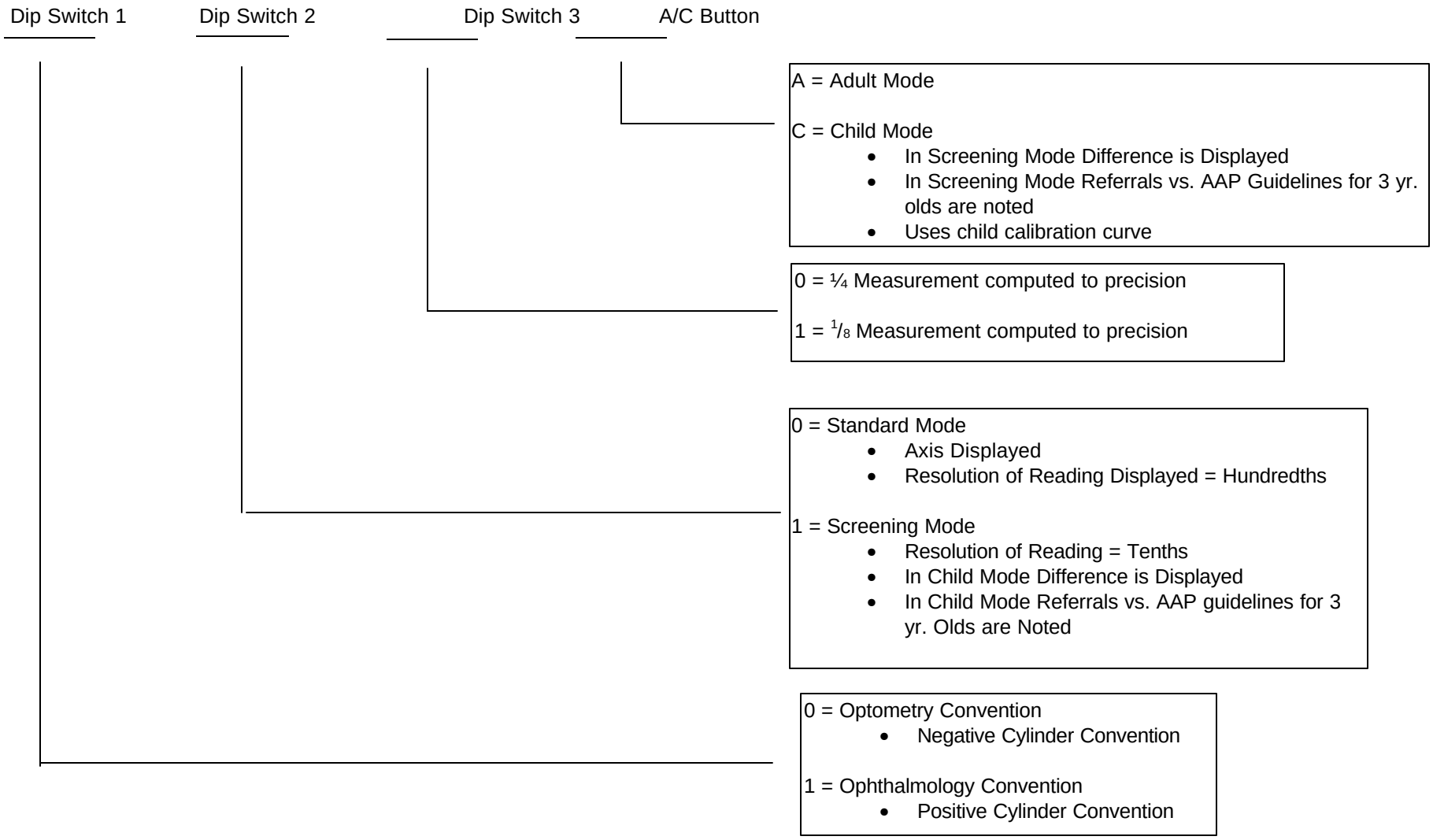
PRIMARY CARE DEVICE CONFIGURATION:

* Resolution of Reading Displayed = Tenths
* Measurement Range = -4.5D to +5D



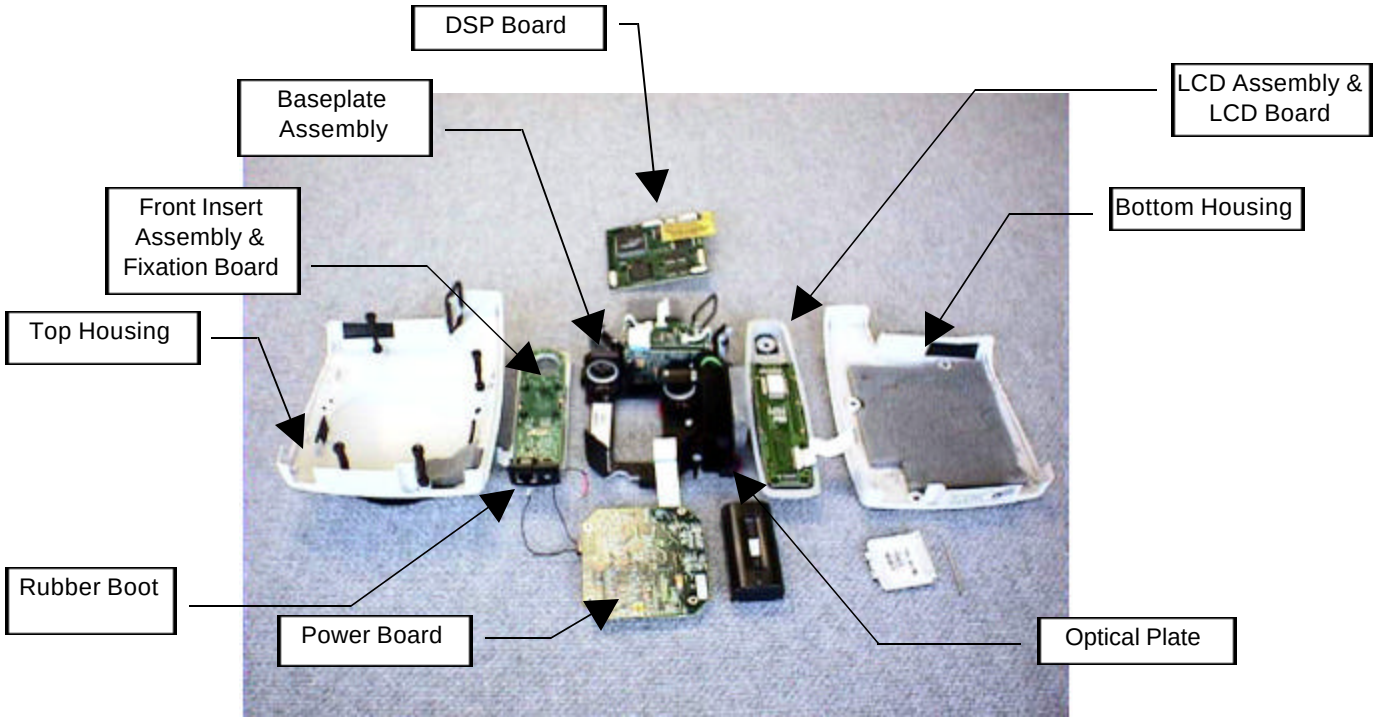
EYE CARE DEVICE CONFIGURATION

* Measurement Range = -5D to +5D


Dip Switch 1
Dip Switch 2
Dip Switch 3
A/C Button
A = Adult Mode
C = Child Mode
• In Screening Mode Difference is Displayed
• In Screening Mode Referrals vs. AAP Guidelines for 3 yr. olds are noted
• Uses child calibration curve
0 = ¼ Measurement computed to precision
1 = 1/8 Measurement computed to precision
0 = Standard Mode
• Axis Displayed
• Resolution of Reading Displayed = Hundredths
1 = Screening Mode
• Resolution of Reading = Tenths
• In Child Mode Difference is Displayed
• In Child Mode Referrals vs. AAP guidelines for 3 yr. Olds are Noted
0 = Optometry Convention
• Negative Cylinder Convention
1 = Ophthalmology Convention
• Positive Cylinder Convention

SECTION 4: SURESIGHT REPAIR INSTRUCTIONS

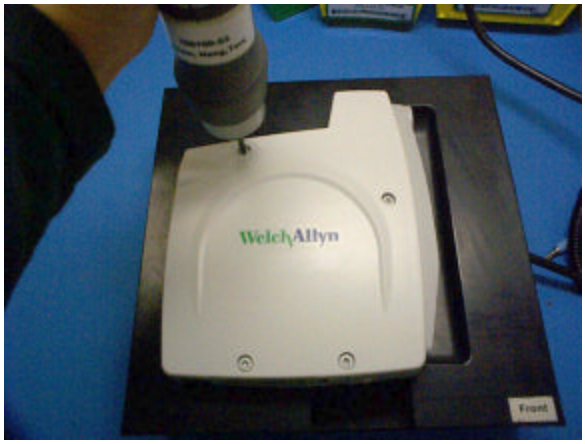
***NOTE: ALL REPAIR PROCEDURES MUST BE FOLLOWED BY A CALIBRATION CHECK (SEE SECTION 2.2), WITH THE EXCEPTION OF SECTIONS 4.12, 4.14 (IF UNIT IS NOT OPENED), 4.15, AND 4.16.**



4.1. REPLACEMENT OF BOTTOM HOUSING

4.1.1. Place unit in nest T16556, with bottom housing facing up.

4.1.2. Remove the 4 T-20 torx screws from bottom housing.



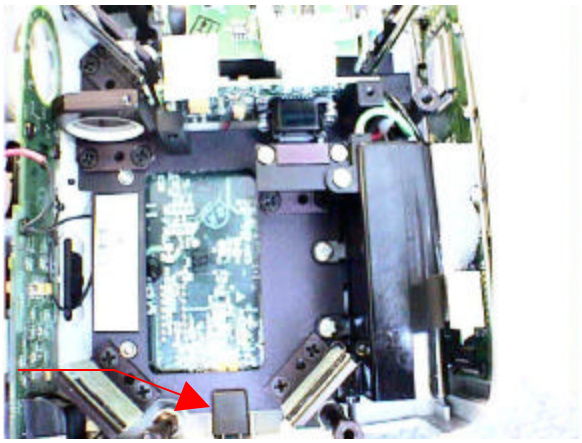
4.1.3. Gently remove housing. It may be necessary to hold the front insert down as the housing is removed.

4.1.3.1. Prior to replacement verify the black tape is visible and in its proper location.

`1

4.1.3.2. Ensure that the bumpers are seated correctly, down and completely in their cut out areas, in the top housing.

One of the three bumpers seated in cut out area



4.1.3.3. Replace housing by aligning the front insert and LCD assembly with the guides on the bottom housing.

4.1.3.4. Ensure the housing aligns with the battery door and patient window.

4.1.3.5. Re-torque to 5.5 - 7.5 in-lb., using torque driver T1562-12. (See drawing 140000 - Appendix D)

4.1.3.6. Verify no flexes are caught in between the housings.

4.2. REPLACEMENT OF FLEX

4.2.1. Place unit in nest T16556, with bottom housing facing up.

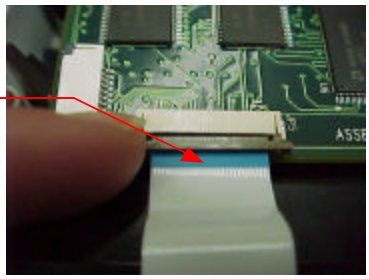
4.2.2. Remove bottom housing. *(See Section 4.1)*

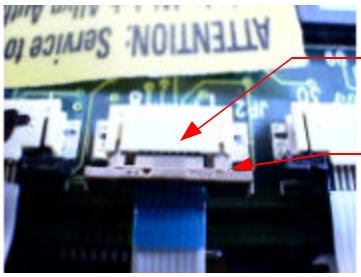
4.2.3. Remove glue or kapton tape, if it exists, from the flex.

4.2.4. Locate the tabs bar, of the flex insert, toward the flex.

4.2.5. Pull out the tab bar away from the flex connector body to loosen the connection, which will allow the flex to slide out. Make sure both sides of the tab are unlatched.

Glue or Kapton Tape will be on this flex.





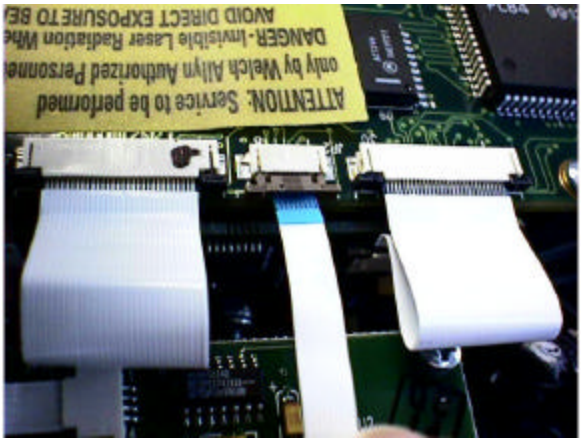
Connector body

Tab Bar. Pull bar out to loosen.

4.2.6. Replace the flex by holding the tab bar out and sliding the flex back into the connection:

4.2.6.1. Note the flex has an insulated side and a side with connectors.

4.2.6.2. Place the connector side, of the flex, toward the connector side of the flex insert. This is always the opposite side from where the tab bar is.


ATTENTION: Service to be performed
only by Welch Allyn Authorized Personnel
DANGER-Invisible Laser Radiation When
AVOID DIRECT EXPOSURE TO BE

Slide the tab bar in to tighten.

4.2.6.3. Once the flex is slid into the flex insert, slide the tab bar back into place. Make sure that the flex is straight, or connections will not be properly made.

4.2.6.4. If the flex, that had been removed had either glue or kapton tape on it, replace with kapton tape only.

4.3. REPLACEMENT OF DSP BOARD

4.3.1. Place unit in nest T16556, with bottom housing facing up.

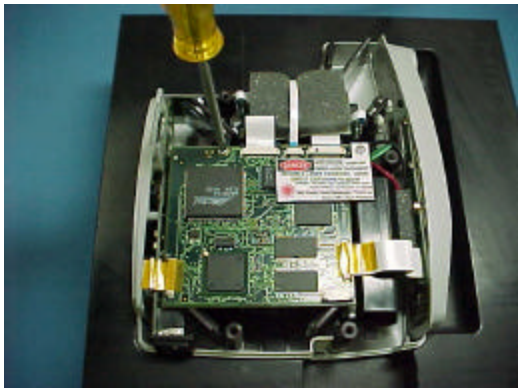
4.3.2. Remove bottom housing *(See Section 4.1)*.

4.3.3. Disconnect the flexes, located on the DSP board that connect from the LCD board, fixation board, laser board, power board and the camera board. *(See Section 4.2)*.

4.3.3.1. Note that the fixation and LCD flex may have glue or Kapton tape over them, to keep them secure.

4.3.3.2. Remove glue or kapton tape from the connector. To prevent damage, peel the hardened glue or kapton tape in the direction of the flex, NOT toward the connector, or the connector may be damaged or peel off.

4.3.4. Once flexes are clear, remove the 2 screws from the DSP board and carefully lift it out of the unit.

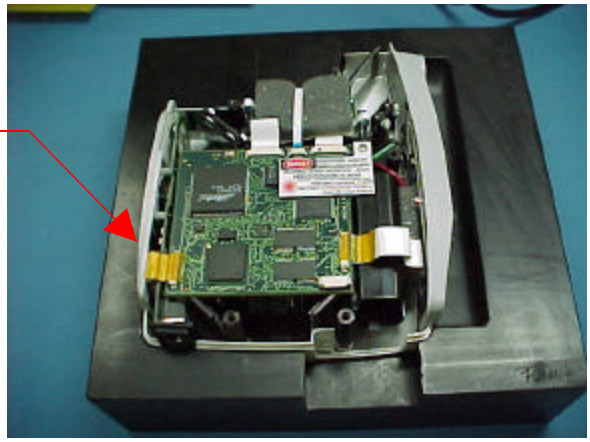


4.3.5. Replace the new DSP board, battery side down, onto the aligned plate assembly, aligning holes in board with mounting holes.

4.3.5.1. Replace the laser tag on the right screw, then fasten the DSP board with the 2 screws. Torque screws to 1.5 - 2.0 in-lb., using torque driver T1562-23 . *(See Drawing 140000 - Appendix D)*

4.3.5.2. Reconnect the removed flexes to the proper positions, *(See Section 4.2)*, then using Kapton tape only, tape together the flex and the connector.

Kapton Tape on the flex and connector



4.3.6. Replace the bottom housing and fasten together. *(See Section 4.1)* Once the unit is reassembled, download the software *(See Section 2.7)*

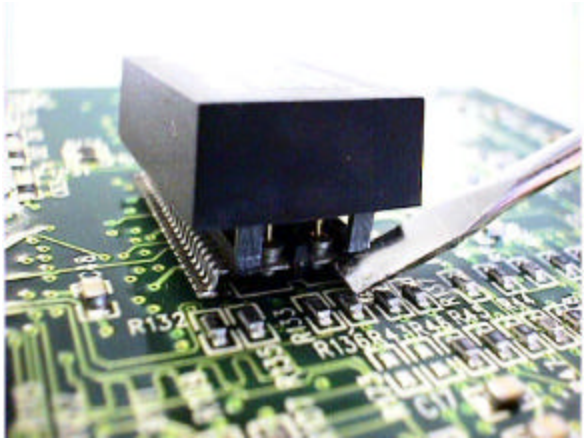
4.4. REPLACEMENT OF RTC BATTERY

NOTE: The RTC battery should last 10 years from its initial placement.

4.4.1. Remove the DSP Board. *(See Section 4.3)*

4.4.2. Disconnect RTC battery from bottom of DSP board:

4.4.2.1. Being very careful not to break the legs of the RTC battery or damage the pins of the IC chip off of the pad, pry the four outer legs of RTC battery away from the board.



4.4.3. Place the new RTC battery onto the DSP board:

4.4.3.1. Align the 4 pins and the alignment tab, of the RTC battery, to the 4 holes and slot on the IC chip.

4.4.3.2. Press the RTC battery down to securely clip onto the IC chip.

NOTE: RTC battery is keyed - DO NOT force it down - make sure its tabs align with RTC chip slots.

4.4.4. One the unit is reassembled, download software. *(See Section 2.7)*

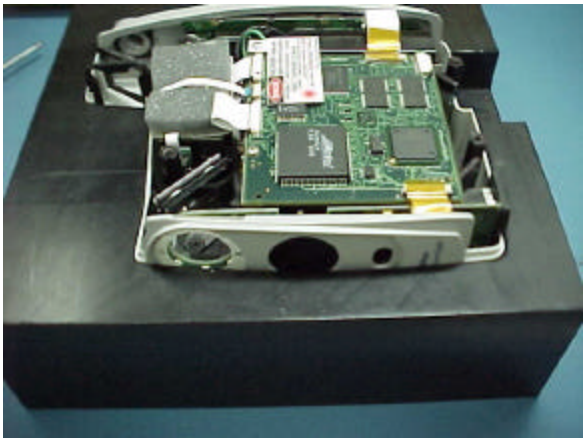
4.5. REPLACEMENT OF FRONT INSERT ASSEMBLY

4.5.1. Place unit in nest T16556, with bottom housing facing up.

4.5.2. Remove the bottom housing *(See Section 4.1)*.

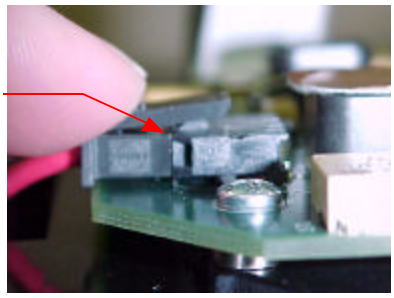
4.5.3. Lift the baseplate sub-assembly, with front insert and LCD assembly out of the top housing and disconnect the distance wire assembly from the power board, as well as the front insert flex to the DSP board.

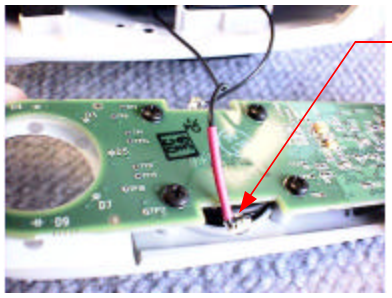
4.5.4. Remove the Front Insert Assembly by sliding it up.



NOTE: You MUST replace the distance wire assembly whenever it is removed from the sensor contacts. It is a single use spring clip only.

Disconnect the wire harness from the power board





Disconnect the wire harness from the ultrasonic sensor

4.5.5. Replace the front insert assembly and the distance wire assembly:

4.5.5.1. Clip the new distance wire assembly on to the power board.

4.5.5.1.1. Connect the black wire onto the silver tab of the sensor.

4.5.5.1.2. Connect the red wire to the copper tab of the sensor.

4.5.5.2. Replace the entire assembly back into the top housing. Align the bumpers and seat correctly in the guides, on the top housing.

4.5.5.2.1. Slide the front assembly into the unit so that the rubber boot fits into the opening and the tabs of the front insert align with the guides on the bottom housing. Check to make sure there are no wires caught in between the front insert and the bottom housing.

4.5.5.2.2. Reconnect the flex to the DSP board, then using kapton tape, tape together the flex and the connector. *(See Section 4.2)*

4.5.5.2.3. Ensure the bumpers are seated correctly, down and completely in their cut out areas.

4.5.5.2.4. Place the bottom housing back on to the unit. *(See Section 4.1)*

4.5.6. Once the unit is reassembled, download software *(See Section 2.7)*

4.6. REMOVAL OF O-RING

4.6.1. Place unit in nest T16556, with bottom housing facing up.

4.6.2. Remove bottom housing *(See Section 4.1)*.

4.6.3. Locate o-ring on the ultrasonic sensor and wire harness assembly.

4.6.4. Lift the o-ring away from any wires and clip with a small pair of cutters. Be careful not to damage anything around the o-ring, especially the gold contact and wire assembly.

4.6.5. Remove o-ring with tweezers. As much as possible, pull o-ring away from gold contact.

4.6.6. Replace bottom housing. *(See Section 4.1)*

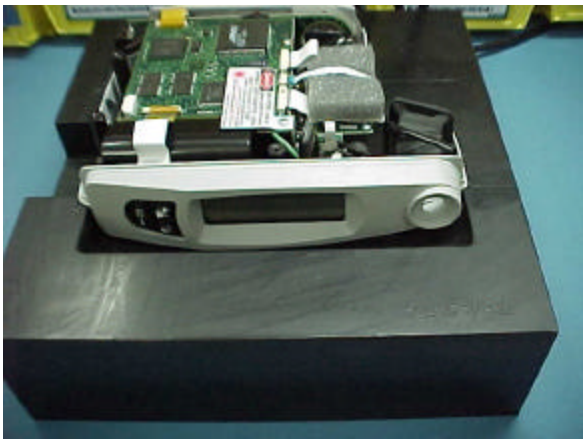
4.7. REPLACEMENT OF THE LCD ASSEMBLY

4.7.1. Place unit in nest T16556, with bottom housing facing up.

4.7.2. Remove the bottom housing. *(See Section 4.1)*

4.7.3. Remove glue or kapton tape on LCD flex and disconnect the flex from the DSP board *(See Section 4.2)*.

4.7.4. Slide the LCD assembly out of the unit.



4.7.5. Make sure to copy over the dip switch settings from the old LCD.

4.7.6. Replace the LCD Assembly by sliding it back into its original place.

4.7.6.1. Slide the assembly back into place by lining it up with the guides on the top housing.

4.7.7. Reconnect the LCD flex to the DSP board, then using kapton tape only, tape together the flex and the connector.

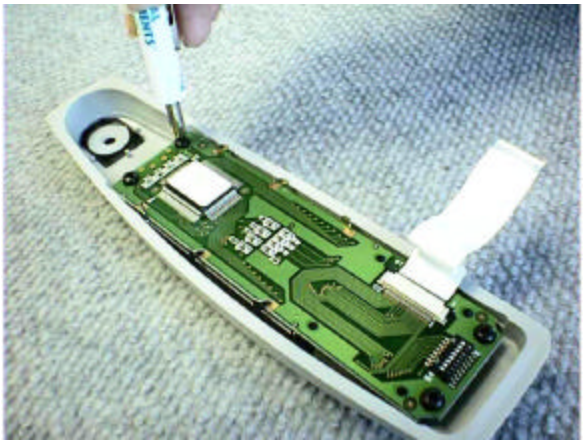
4.7.8. Replace bottom housing. *(See Section 4.1)*

4.7.9. One the unit is reassembled, download software. *(See Section 2.7)*

4.8. REPLACEMENT OF LCD BOARD

4.8.1. Remove LCD Assembly *(See Section 4.7)*.

4.8.2. Remove the 4 screws.



4.8.3. Remove the LCD board and replace. Make sure to transfer buttons to new assembly. Also, copy dip switch settings from old LCD board.

4.8.4. Reattach the board with the screws. Torque screws to 2.75 - 3.75 in-lb., using torque driver T1562-12. *(See Drawing 140000 - Appendix D)*

4.8.5. Replace LCD assembly *(See Section 4.7)*.

4.8.6. Replace the bottom housing. *(See Section 4.1)*

4.8.7. Once the unit is reassembled, download software. *(See Section 2.7)*

4.9. REPLACEMENT OF BATTERY COMPARTMENT ASSEMBLY

4.9.1. Place unit in nest T16556, with bottom housing facing up.

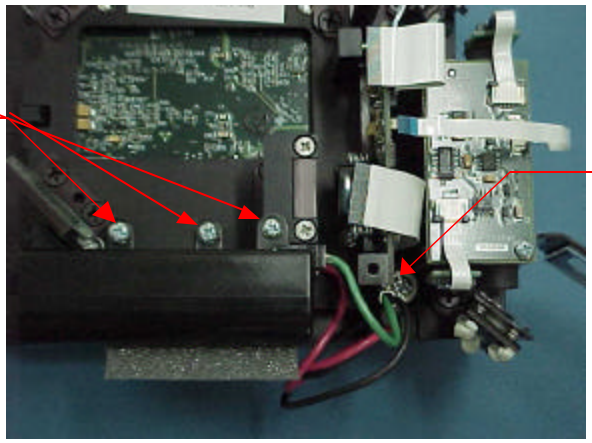
4.9.2. Remove bottom housing *(See Section 4.1)*.

4.9.3. Lift baseplate assembly, with LCD assembly and front insert assembly, out of the top housing. Make sure to disconnect front insert distance wire assembly from connection on the power board and disconnect the LCD flex and the front insert flex from the DSP board. Remove bumpers and place on baseplate support fixture T16541.

4.9.4. Disconnect the DSP board. *(See Section 4.3)*

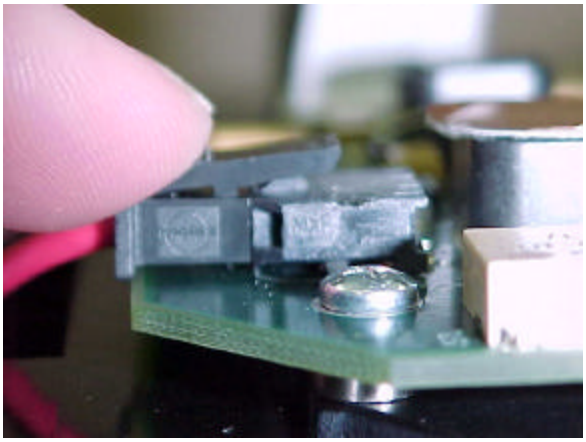
4.9.5. Remove 3 screws from battery retainer unit.

4.9.6. Remove the 1 screw from the green ground wire.



4.9.7. Remove the black and red wire clip from bottom of the power board:

4.9.7.1. Squeeze the clip down on the side of the wires and slide out.



4.9.8. Before installing battery compartment assembly, verify wires are in correct slots. With compartment opening facing you, slot side down, the red wire should be on the bottom side and the green wire should be on the top side. The black wire should be connected with the green wire at the contact and then connected with the red wire at the clip. DO NOT USE ANY BATTERY COMPARTMENT THAT IS NOT CORRECTLY WIRED.

4.9.9. Replace the battery compartment assembly:

4.9.9.1. Connect the black and red wire to the bottom of the power board by sliding the clip on.

4.9.9.2. Attach the battery compartment to the baseplate assembly with the three screws. Torque to 1.5 - 2.0 in-lb., using torque driver T1562-23. *(See Drawing 140000 - Appendix D)*

4.9.9.3. Ensuring that the wires are close to the camera and out of the way of the standoff, secure the green ground wire, with one screw, to the baseplate. Torque to 3.5 - 4.5 in-lb., using torque driver T1562-12. *(See Drawing 140000 - Appendix D)* If needed bend the contact at a 90^{o} angle to place wires out of the way of the standoff.

4.9.9.4. Place a new piece of foam on the side of the battery compartment. The foam should be placed between the end of the cut out, on the side of the compartment, and the closed end on the compartment.

4.9.10. Replace the DSP board *(See Section 4.3)*.

4.9.10.1. Place the entire assembly back into the top housing by lining up the bumpers into guides, in the top housing. Make sure they are down and fully in their cut out area.

4.9.11. Replace bottom housing. *(See Section 4.1)*

4.9.12. One the unit is reassembled, download software. *(See Section 2.7)*

4.10. REPLACEMENT OF POWER BOARD

4.10.1. Place the unit in nest T16556, with bottom housing facing up.

4.10.2. Remove the bottom housing *(See Section 4.1)*, front insert assembly *(See Section 4.5)*, and LCD assembly *(See Section 4.7)*

4.10.3. Remove the baseplate assembly, along with the LCD assembly and the front insert assembly, from the top housing.

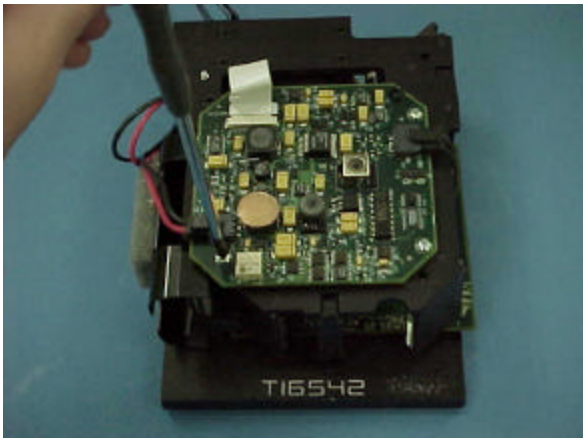
4.10.4. Turn baseplate assembly over.

4.10.5. Disconnect the battery compartment assembly wire connection and fixation wire assembly from the power board.

4.10.6. Place the assembly on the base plate support fixture T16542.

4.10.7. Disconnect power flex from the power board.

4.10.8. Remove the 4 screws from the power board.



4.10.9. Replace the power board:

4.10.9.1. Attach the new power board, so that the battery retainer clip is closest to the battery retainer side and the flex insert is closest to the open slot of the alignment plate. Torque to 1.5 - 2.0 in-lb., using torque driver T1562-23. *(See Drawing 140000 - Appendix D)*

4.10.9.2. Reconnect the battery compartment wire assembly to the proper connection on the power board.

4.10.9.3. Reconnect the power flex to the new power board.

4.10.9.4. Reconnect the a new wire harness assembly to the proper connection the power board.

NOTE: You MUST replace the wire harness whenever it is removed from the sensor contacts. It is a single use spring clip only.

4.10.9.5. Place the assembly back into the top housing by lining up the bumpers in the guides on the top housing. Ensuring that the battery compartment assembly wires are tucked underneath and that the ultrasonic sensor wires are free and out of the optical pathway.

4.10.10. Replace LCD assembly *(See Section 4.7)* and bottom housing *(See Section 4.1).*

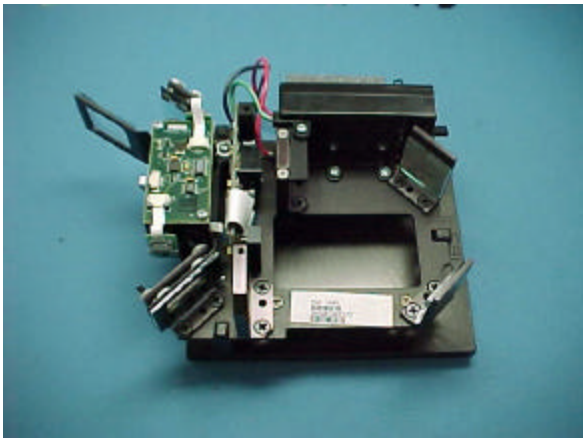
4.10.11. Once the unit is reassembled, download software. *(See Section 2.7)*

4.11. REPLACEMENT OF THE ALIGNED BASEPLATE ASSEMBLY

4.11.1. Place the unit in nest T16556, with bottom housing facing up.

4.11.2. Remove the bottom housing *(See Section 4.1)*, DSP Board *(See Section 4.3)*, front insert assembly *(See Section 4.5),* LCD Assembly *(See Section 4.9)* and Power board *(See Section 4.11)*

4.11.3. Remove the rest of the baseplate assembly.



4.11.4. Remove the 4 bumpers from the old aligned baseplate assembly.

4.11.5. Place the new baseplate assembly on baseplate support fixture T16542.

4.11.6. Write the Product Serial number (located on the battery compartment door) on the new baseplate (next to the baseplate serial number). Then write the new baseplate number on the label in the inside of the door of the battery compartment.

4.11.7. Replace the power board to the new aligned baseplate assembly *(See Section 4.11)*

4.11.8. Connect the battery compartment wire assembly to the power board.

4.11.9. Turn the baseplate assembly over and place on baseplate support fixture T16541.

4.11.10. Replace the DSP board *(See Section 4.3).*Attach the LCD assembly *(See Section 4.7)* and the front insert assembly *(See Section 4.5)* to the DSP board.

4.11.11. Connect the distance wire assembly clip to the power board.

NOTE: You MUST replace the wire harness whenever it is removed from the sensor contacts. It is a single use spring clip only.

4.11.12. Replace the 4 bumpers on the new aligned baseplate assembly.

4.11.13. Place the top housing in nest T16556.

4.11.14. Place the assembly into the top housing by lining up the bumpers in the guides, on the bottom housing.

4.11.15. Replace the bottom housing. *(See Section 4.1).*

4.11.16. Once the unit is reassembled, download software. *(See Section 2.7)*

4.12. REPLACEMENT OF HAND STRAP

4.12.1. Position the unit so that the hand strap is facing up and the battery door compartment is toward you.

4.12.2. Push the hand strap forward until the square notches beneath it are visible; hold the strap in this position with one hand.

4.12.3. Insert the tool provided into one of the notches and press outward until the fastener is released.

4.12.4. Repeat step 4.12.3 on the other fastener.

4.12.5. Insert the fasteners of the new strap into the appropriate slots, so that “Welch Allyn” can be read.

4.12.6. Pull on the strap to ensure that it is seated properly.

4.13. REPLACEMENT OF THE TOP HOUSING

4.13.1. Place unit in nest T16556, with bottom housing facing up.

4.13.2. Remove bottom housing (*See Section 4.1)*, the front insert assembly *(See Section 4.5)*, the LCD assembly *(See Section 4.7)* and the patient window.

4.13.3. Remove the remaining assembly from the top housing.

4.13.4. Remove the hand strap. *(See Section 4.12)*

4.13.5. Prior to installing the top housing, ensure the black Kapton tape is present.

4.13.6. Place the new top housing into nest T16556.

4.13.7. Replace the baseplate assembly *(See Section 4.11)*, front insert assembly *(See Section 4.5)* and LCD assembly *(See Section 4.7)*

4.13.8. Replace the patient window:

4.13.8.1. Ensure the window is clean before replacing. *(See Section 4.14)*

4.13.8.1.1. Ensure that the gasket is wrapped around the window correctly.

4.13.8.1.2. Slide the window, with the unconnected seam side of the gasket down, into the guides on the top housing.

4.13.8.2. Place the bottom housing back onto the top housing, ensure that the LCD assembly, front insert assembly, patient window and battery door are aligned in the proper places.

4.13.8.3. Reinsert screws. Torque to 5.5 - 7.5 in-lb., using torque driver T1652-12. *(See drawing 140000-Appendix D)*

4.13.8.4. Replace Hand Strap *(See Section 4.12)*

4.14. CLEANING OF THE WINDOWS

4.14.1. All windows on the Sure Sight may be cleaned with a soft window (scratch resistant) cloth moistened with 70% Isopropyl Alcohol or any standard window cleaner.

4.14.2. Be sure not to leave streaks to ensure proper function.

4.14.3. On older units the patient window may have excess scratches. Replace with new (harder coated) window. *(See S/N Revision Log)*

4.15. HEWLETT PACKARD PRINTER CHECK

4.15.1. Make sure there is paper in unit. Install 536000 if needed.

4.15.2. While holding down the paper advance button , turn unit on then release paper advance button.

4.15.3. Printer should print out a self-test. Make sure everything is clear and readable.

4.15.4. The battery reading on the bottom of self-test should be 3,4 or 5. Replace the batteries if reading is 0 or 1.

4.15.5. Down load information from a unit.

4.15.6. Turn unit off.

4.15.7. Placed printer back with customer order.

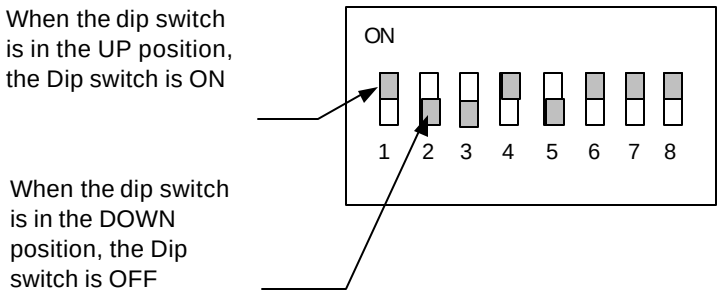
4.15.8. Use PRT as a work unit code with an inspect time of 10 minutes.

Note: If unit is from a warranty replacement and there is not paper in it and batteries are in the Styrofoam insert - unit was never used - OK to send back to stock as new without running self-test. Make sure there is a roll of paper, manual and card in box.

4.16. DIP SWITCH CHANGES

4.16.1. Open the battery compartment door and locate dip switches underneath the battery compartment, on the LCD board.

4.16.2. Using the tool provided, pull of push the dip switch to the On or OFF Position. *(See diagram below)*


When the dip switch is in the UP position, the Dip switch is ON
When the dip switch is in the DOWN position, the Dip switch is OFF
ON
1 2 3 4 5 6 7 8

PAGE 1 OF 9	SIZE	DRAWING NUMBER	REV
	A	A04187	B

PROCESS SHEET FOR:

SureSight

Final Test Specification

DRAWN: C. Fahrenkrug	DATE: 3.30.00
APPROVED: Rich Andrews	DATE: 3.30.00
REL TO PROD:GR Waclena	DATE: 3/30/00

REV	REV DESCRIPTION	ECN #	INIT	DATE	APPR
A	Release to Production	5-41157	CCF	03.30.00	RGA
B	Added clarifying repair notes - p6&7	5-41599	CCF	06.29.00	RGA

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GENERAL

PCBA tester must do/verify the following functions:

1. Default Calibration Record
2. Unit Information
3. Distance sensor calibration
4. User Indicators: Fixation LED's, LCD operation, Alignment Crosshair
5. Button operation
6. Print operation (IR)
7. RS232 - Download Operation
8. Laser levels (Minimum, Nominal, Maximum)
9. Camera Gain Setting
10. Refractive readings (Sphere and Cylinder)
11. Charge Current
12. Low Battery Detect and Low Battery Warning
13. Nominal Current Draw
14. Real Time Clock

Unless otherwise specified:

- All measurement accuracies to be within 2%.
- All voltage and current is expressed as RMS.
- Input voltages to be maintained within 5%.
- All communications to unit are through USB interface using cable 140104-1 except step 7 which uses the RS232 interface and cable 140104-2.

1. DEFAULT CAL RECORD

• Apply Supply Voltage to the unit 7.2V to 8.0V at the battery terminals	*Nominal voltage range ± 5%

• Default CAL Record to be loaded into unit prior to calibration including the following settings:
  • Camera set to step 23
  • Exposure set to 1 frame
	*Zero out distance offset
	*Open Laser range
	*Set Exposure

• CAL fields to be updated throughout tests as described below.	
•	

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2. UNIT INFORMATION

• CAL Record should include the following information:
  • Serial Number
  • Software Revision
  • Hardware Revision
  • Odometer
  • FPGA Revision
•
	*See also History Log Aspec's.
	
	*Tracks number of tests.

•	

3. DISTANCE CALIBRATION

• Measure distance at four distances between 200 & 500 mm. • Distances to be approximately evenly spaced to allow best data for linearization. • Distance positions to match "true" settings within 2mm. (actual vs. Programmed)	*Target to be 5" x 5" of any solid material including ABS *Distances selected should be approximately 200,300,400, 500 mm.**
• Compute the average offset of the distance sensor over this 200 to 500 mm range and load it into the CAL record.	*All measurements to be taken from front of unit at the center of the distance measurement opening.
• If Offset computed is >24 mm FAIL unit.	*Typical Offset 7-15 mm
• Return to the 200mm location and measure the position. Return distance must be within 2mm of 200mm actual.	*Where actual is the physical position of the tester block with respect unit front at ultrasonic port.
•	

**These selected positions may vary from recommended up to 20 mm. However, their exact location must be determined to use as the "true" setting for comparison to the instrument reading.

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4. USER INDICATORS: FIXATION LED'S, LCD, CROSSHAIR

• Light fixation LED's and verify that they function and flash.	
• Light LCD segments and insure that they all turn OFF and ON	
• Light green viewing crosshair and insure that it is visible.	
• If any of these indicators do not function as stated, FAIL unit.	

5. BUTTON OPERATION

• Press each button separately and verify that each returns its own value only. The corresponding values are: • Left = 1 • Right = 2 • Center = 0	*SDK returns these values based on button selected.
•	

6. PRINT OPERATION (IR)

• Print test assumes use of an HP82240B IR printer • Print test sentence from 18 inches ± 2 inches • Insure that no letters are skipped and no error boxes (■) are printed.	
•	

7. RS232 - DOWNLOAD OPERATION

• Connect cable 140104-2 connected between unit and PC running Win98, latest revision of WA_Down and FPG .DLL	*See BOM for current revision level.
• Download latest version of software and update Unit Information.	
• Note: If this function is performed on a previous station, it is not required a second time.	

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8. LASER SETTINGS

• All laser readings to be done on a UDT meter with a single point 780nm calibration • Readings must be done in ambient light lower than .4µW for all steps in this section.	*780 single point cal to be the only cal in the UDT meter to avoid risk of incorrect cal usage. Nominal wavelength of laser is 785nm.
• Step laser pot down at least 120 steps to insure that it is at its minimum.	*Will guarantee that 100 step pot will be at its minimum.
• Step pot up one step at a time until the laser power is greater than or equal to 7 µW, but less than 16µW. Log this pot setting as the laser minimum setting. • Store both the laser step and the actual light output in µW in test record.	*The purpose of this step is to demonstrate "normal" ability to adjust laser - actual value is less important, and not used in product function.
• Step pot up one step at a time until the laser power is greater than 17 µW, but less than or equal to 22 µW. Log this pot setting as the laser nominal setting. • Store both the laser step and the actual light output in µW in test record.	*This nominal setting results typically in 18 µW. This value is used during product function.
• Step pot up one step at a time until the laser power is greater than or equal to 28 µW, but less than 33 µW. Log this pot setting as the laser maximum setting. • Store both the laser step and the actual light output in µW in test record.	*The purpose of this step is to demonstrate "normal" ability to adjust laser - actual value is less important, and not used in product function.
• Laser reading must be repeated (at nominal) a second time during the test sequence. This reading should be sequenced so that the operator must realign to get the reading. • Reading to be within nominal specifications above (17µW to 22µW)	*Addresses FMEA issue that a misaligned laser would be accidently set too high.
• Turn laser off, and measure output power. • Output power to be less than .4µW	*Addresses potential comparator failure at output which leaves laser on at approximately .5µW.
•	

9. CAMERA GAIN SETTING

• Set the camera gain to step 23.	Gain is a constant pot step
• This setting must be present prior to boundary value checks.	All boundary checks assume this setting.
•	

10. REFRACTIVE READINGS

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• Activate unit with the laser set at nominal and the camera setting at nominal as determined in prior steps.	
• Align unit with glare and image as central as possible, preferably within the green box.	*Do not align to green box if it causes image to be clipped.
• With .9 ND filter present - refract the zero eye position.	*.3 and .6 together.
• Reduce .6 ND filter. • Refract all remaining lenses and compare to limits as described in Appendix 1. • Values to be within attached boundary limits Due to alignment variations - up to 3 failures are allowed for a unit to "Pass" the boundary tests.	*4 or more lens failures equal a fail.

11. CHARGE CURRENT (For Repair Spec's see Service Manual)

• Connect current meter in series with battery connection.	*Note - this current will be larger than actual charge current - See Aspec specified on BOM for proper derivation.
• Attach a 71040 to charging jack. (Note: battery connection must be made prior to attachment of 71040)	
• Measure the current through the current meter.	
• Requirement: $200mA \geq I \geq 150mA$	*Intended to correspond with 150mA.

12. LOW BATTERY FUNCTIONS (Not required for Repair)

• All voltages shown below are referenced to the power board. If voltage drop occurs between supply and unit (due to wires, relays, etc) the actual input should be adjusted to yield the specified voltage at the power board.	
• Set Input voltage to 7.4V • Verify that neither LBW nor LBD are set.	*LBW=7.3V max, 6.8V min. (7.056 nom)
• Set Input voltage to 6.5V • Verify that LBW is set, but LBD is not.	*LBD=6.4V max, 6.0V min. (6.256 nom)
• Set Input voltage to 5.9V • Verify that LBW and LBD is set.	*Unit will not function at this voltage level. This is optional to test in the final assembly, but preferred if possible.

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13. NOMINAL CURRENT DRAW (Not required for Repair)

• Restore input voltage to 8.0 to 8.4V	*Nominal voltage.
• With unit in "ON" mode (MCU powered up), measure the input current.	
• Requirement: 300mA < I <550mA	*Nominal = 477mA
•	

14. REAL TIME CLOCK SETTING

• Set Real Time Clock to Skaneateles date and time.	*Note: Clock is not to be reset to other time zones - it is for factory use only.
• Set Cal Location to WA Skaneateles	*Record location of last calibration.
•	

15. DISTANCE TARGET SIZE/RELIABILITY

• Set distance block at 500mm position.	Position can be ± 20 mm.
• Unit must detect the presence of the distance block on 500 consecutive measurements. Measurements must not deviate from nominal setting by more than 2 mm, or unit is a fail.	*Addresses lowered sensitivity which occurs when ultrasonic sensor is improperly assembled.
•	

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Appendix 1: Refraction Boundary Limits*

*Refer also to Fake Eye Aspec for additional specifications.

Sphere Set

	Sphere		Cylinder	
Lens	Max	Min	Max	Min
1	0.5	-4.0	2.8	0
2	4.7	-0.6	3.0	0
3	9.7	2.4	3.4	0
4	13.9	7.9	4.7	0
5	19.9	12.5	6.2	0
6	26.0	16.4	6.9	0
9	-3.2	-7.9	4.3	0
10	-6.6	-11.5	3.0	0
11	-9.5	-14.7	3.2	0
12	-12.4	-18.0	2.8	0
13	-15.0	-20.2	2.7	0

Cylinder Set

	Cylinder		Sphere		Axis	
Lens	Max	Min	Max	Min	Max	Min
15	6.3	1.7	2.1	-4.3		
16	11.0	5.9	1.6	-4.2		
17	18.5	7.7	2.3	-4.7		
18	25.8	12.8	2.0	-5.1		
21	7.2	1.7	-1.8	-9.8		
22	10.1	5.2	-4.8	-13.0		
23	13.9	7.1	-8.1	-15.7		
24	16.3	11.0	-11.6	-18.3		

Note that Axis accuracy was qualified and is not tested in Production.

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Notes:

Due to the large variation in parameters which determine the refractive values, (sphere/cylinder variation from lens value, distance to wheel, exact alignment to lens center, unaccounted for aberrations in lenses, ND power variation, retinal material variation, fake eye actual dimensions, etc) deterministic methods do not yield expected values with an acceptable degree of accuracy. Consequently, boundaries require correlation to positive clinical performance, and are not deductively linked to the lens value placed in the wheel position.

To revise or reset boundaries if tester or wheel are changed, there are two possible means. Five or more units can be tested five times to determine range of values, and then clinically verified to provide proper performance. Since this is very time consuming, the alternative is to test 30 units under the current settings and then use them to reset and or reverify the acceptable range of values under the new setup. During this comparison, standard deviations of the new setup must be sufficiently low so as to allow new boundaries to be set. For reference, a current set of wheel values including standard deviations is included in the wheel verification Aspec listed on the BOM.

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PAGE 1 OF 6	SIZE	DRAWING NUMBER	REV
	A	A04260	B

PROCESS SHEET FOR:

SureSight

Alignment Specification

DRAWN: C. Fahrenkrug	DATE: 05/05/00
APPROVED: RA	DATE: 05/05/00
REL TO PROD: GR Waclena	DATE: 05/05/00

REV	REV DESCRIPTION	ECN #	INIT	DATE	APPR
A	Release to Production	5-41366	CCF	7/17/2000	RA
B	Rev'd p5 to account for Repair plates	5-41599	CCF	6/29/2000	RA

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GENERAL

The purpose of this specification is to provide the product requirements for alignment for the SureSight product. The process aspec is derived based on these specifications, and the actual magnification and camera selected for use in the alignment station tooling. In addition, a specification for the manufacturing setting is listed in addition to the final product requirement. In each case, the manufacturing specification is tighter than the final product specification. This is to insure that the manufacturing setting plus the repeatability variation do not exceed the final product requirement. It should be noted that if the final product requirement is used for the manufacturing setting limits - excessive fallout would be likely at the final tester due to variations in repeatability.

Unless otherwise specified:

- Fake eyes to be built as per Fake Eye Construction Aspec on BOM. Nominally this includes a 4.5mm pupil. (ref)
- All measurements to be completed at nominal working distance = 360mm from first conjugate surface to front surface of fake eye.

1. MAXIMUM GLARE

All alignments to be done with fake eye positioned for maximum glare. Maximum glare occurs when the laser is projected into a fake eye in the center and perpendicular to the lens. This demonstrated by achieving the brightest glare within the image. In general, this will also occur roughly in the center of the return image. See Figure 1.

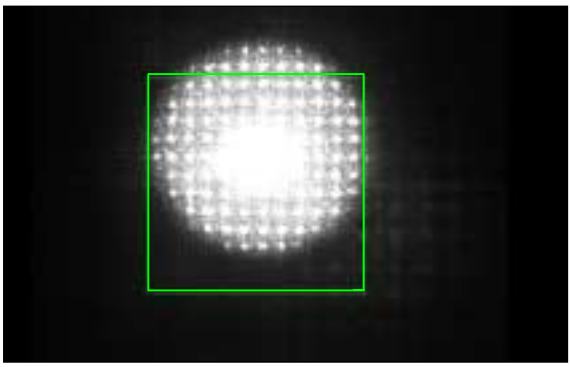

Figure 1

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2. BEAM SPLITTER/CAMERA ALIGNMENT

The purpose of the beam splitter alignment is to place the return image in the center of the camera active area. This insures that the margin of aiming is as equal as possible in the up, down, right, and left directions. For example, if the beam splitter image is aligned toward the top of the camera active area, any slight aiming above this will drop the image off the camera - resulting in no readings.

To facilitate measurement of the image position, a green box function is projected by the software in the exact center of the camera active area, and in a size which represents the 4.5mm image. For reference, the camera active area is 696 by 494 pixels. The green box is 300 by 300 pixels, and positioned with a center of 348,247 to correspond with the center of the active area.

Image position accuracy is measured in number of lines outside the green box. Given the pitch of the lenslet, each line outside the box corresponds to 1mm of offset in the position of the center of the image compared to the center of the camera active area.

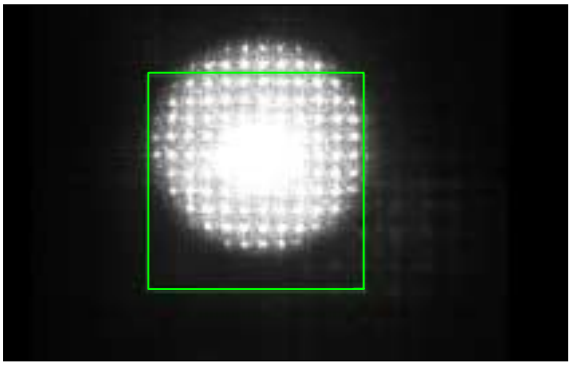

Figure 2

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Row Measurement

The measurement of rows outside the box on any side is as follows:
Only rows which are three or more spots are considered a row.
If the row sits on the green line, it is counted as a half row.
If the row is fully outside the line, it is counted as a full row.
Figures 2 shows some examples of row counts.

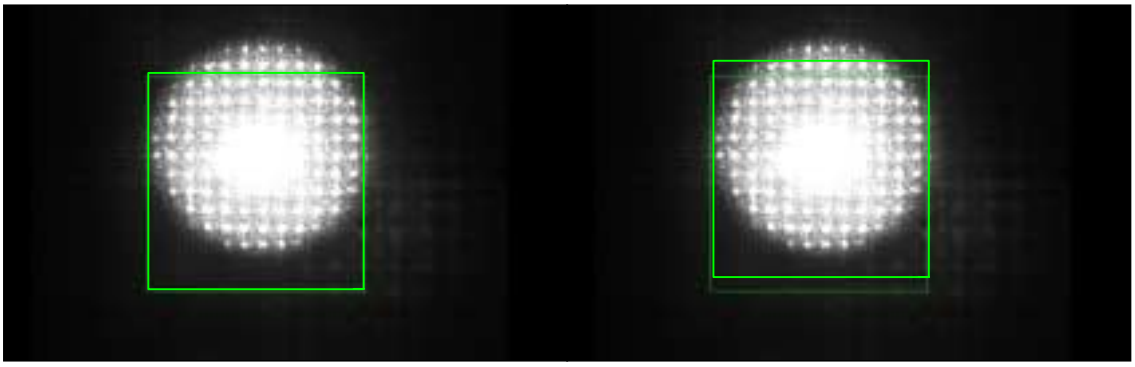

Figure 3:
Fails at Alignment station
Pass at Final Tester

Figure 4:
Pass at Alignment station
Pass at Final Tester

	Allowable image rows outside the green box
	Alignment station Pixels
Manufacturing Setting	1.5
Final Product Specification	2
Repair Specification	2

3. MIRROR ALIGNMENT

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The purpose of the mirror alignment is to place the crosshair image on top of the laser at the nominal working distance. This insures that the when the physician aligns the crosshair with the patients pupil, he is also aligning the laser to the pupil. This is necessary because the laser is not visible and can not be aligned without an alternate means.

As noted below, the alignment station setting specification is .41 mm from the pixel center. This is to insure that it will meet the crosshair product specification of .76mm from the center of the pupil. When unit is initially shipped to the field, Repair Stations are allowed a modest increase beyond this to cover plate to plate variation which is 1-2 pixels (typical).

For convenience, crosshair position accuracy can be measured in pixels from pupil center. The equivalent specifications in pixels for the alignment station as well as for the final tester are listed below.

The acceptable limit for the number of pixels the crosshair center can be from the pupil center is a function of the magnification of the optics as well as the resolution of the observing camera. Any alteration of camera or magnification would require revision to these specifications. The procedure for determining the magnification as well as the number of pixels within the product specification is listed in the next section.

	Measurement Station Used					
	Alignment Station		Final Tester		Repair Stations	
Magnification pixels/mm	14.4		7.9		5.1	
Specifications:	mm	pixels	mm	pixels	mm	pixels
Alignment	.41	5.9	n/a	n/a	n/a	n/a
Final Tester	n/a	n/a	.76	6	n/a	n/a
Repair	n/a	n/a	.76	6	1.18	6

*Note: Specifications are only given on the stations on which they are normally tested. All others are labeled as n/a. Repair Station plates are allowed larger deviation for repair units only and can not be used for new production.

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4. MAGNIFICATION MEASUREMENT

The purpose of the magnification measurement is to determine the pixels per millimeter of a particular optical/camera setting. This magnification is multiplied by the specification in millimeters to convert to specifications in pixels for that station.

Procedure:

1. Place a metric ruler as close to the plane of the fake eye pupil as possible and placed across the pupil so that the numerical labels on the ruler can be seen for at least 30 mm. The ruler tick marks should be clearly visible and the ruler should be as straight as possible.
2. Using FPGEYE software, grab a picture of the ruler and save the image.
3. Open the image using Vision Builder, PC Paint or equivalent.
4. Count the number of pixels which are visible over a 30mm span of the ruler.
5. Compute this number/30 to determine pixels per mm magnification.

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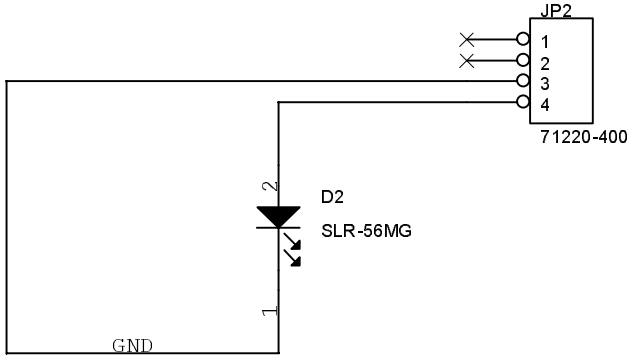
REV	DESRCIPTION	ECN	DATE	APPROVAL
A	Release to Production at X5	5-41452	6/9/00	CCF



Notes:

1. All values are shown for reference only.
   See BOM for proper values.

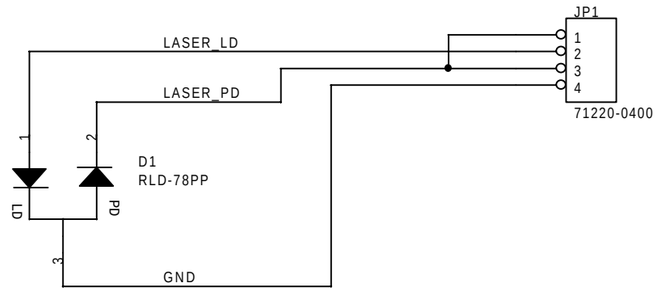
DRAWN E. Dickman	DATE 03/29/99
APPROVED CCF	06/08/00
RELEASED MKT	06/08/00
ENGINEER CCF	PROJECT NO. RD14000

Title
DAVE LED Mini Schematic

Size	Document Number	Rev
A	140151	A

Date: Tuesday, June 27, 2000 Sheet 1 of 1

REV	DESCRIPTION	ECN	DATE	APPROVAL
A	Release to Production at X9	5-41452	6/9/00	CCF



Notes:

1. All values are shown for reference only. See BOM for proper values.
2. PD is sent redundantly on pin1
3. D1 is a single package
4. D1 footprint does not match suppliers recommended dimensions. This reduced format is critical to prevent shorting to the case and should not be changed.

DRAWN	K. HENNING	DATE	10/08/98
CHECKED	CCF		06/08/00
APPROVED	CCF		06/08/00
RELEASED	MKT		06/08/00
ENGINEER	CCF	PROJECT NO.	RD14000

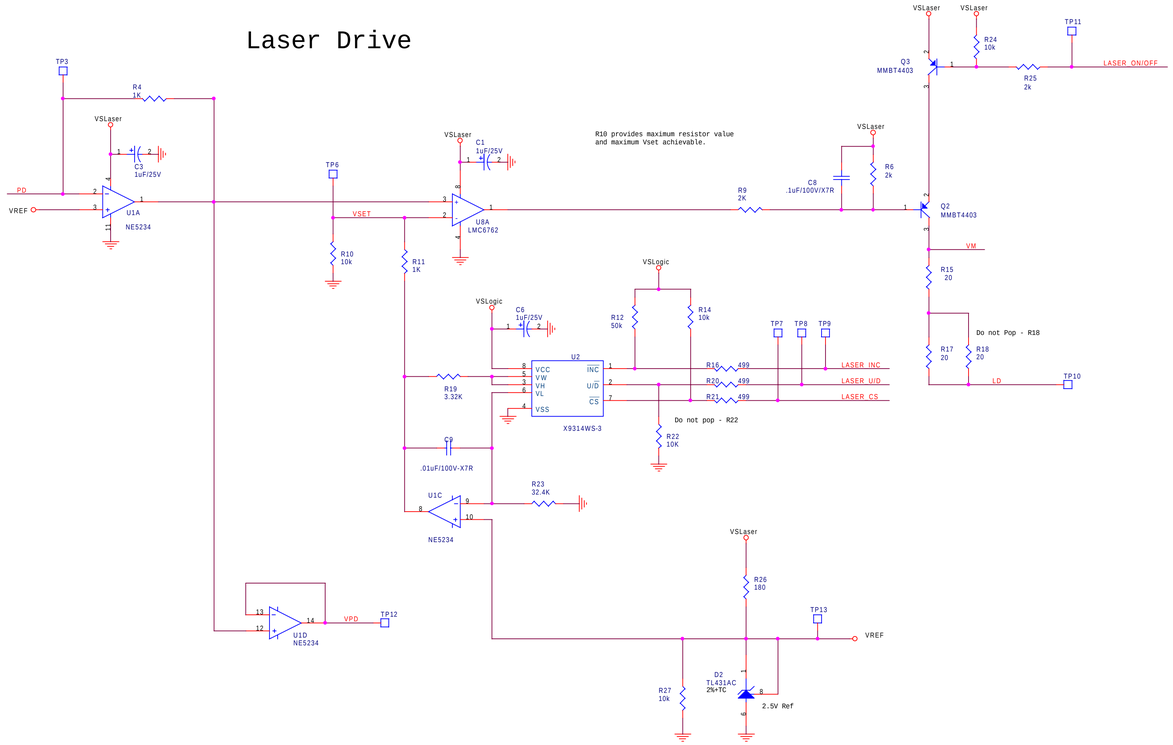
Title: DAVE Laser Mini Schematic

Size: B | Document Number: 140152 | Rev: A

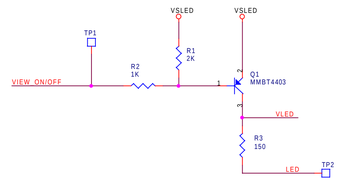
Date: Wednesday, June 28, 2000 | Sheet 1 of 1

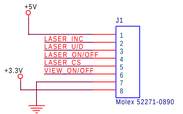
REV	DESCRIPTION	ECN	DATE	APPROVAL
A	Release to Production at X9 : Modifed Q3 / laser on to fix laser / on wheel failures of previous version.	5-41452	6/9/00	CCF

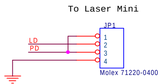
Laser Drive

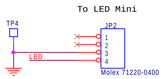


Viewing LED Drive

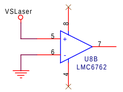


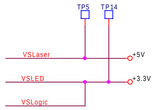






Spares





Notes:

1. All values are shown for reference only.
   See BOM for proper values.
2. Net names on ground symbols may vary.
   No changes should be made to
   allocation without rechecking.
3. Test Point Cross Reference
   TP1 - VIEW_ON/OFF
   TP2 - LED
   TP3 - PD Current
   TP4 - GND
   TP5 - VSLaser
   TP6 - VSET
   TP7 - Laser_CS
   TP8 - LASER_U/D
   TP9 - LASER_INC
   TP10- LD Cathode
   TP11- LASER_ON/OFF
   TP12- PD Voltage
   TP13- VREF
   TP14- VSLED, VSLogic

DRAWN E. Dickman	DATE 03/25/99		
APPROVED CCF	06/08/00	Title DAVE LASER DRIVE Schematic	
RELEASED MKT	06/08/00	Size D	Document Number 140153 Rev A
ENGINEER CCF	PROJECT NO. RD14000	Date: Tuesday, June 27, 2000	Sheet 1 of 1

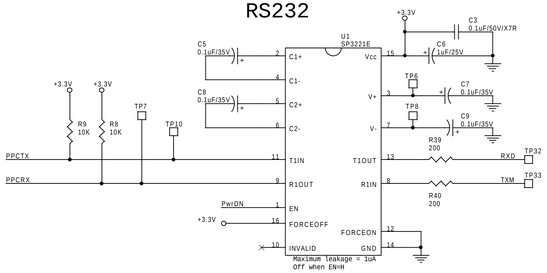
REV	DESCRIPTION	ECN	DATE	APPROVAL
A	Release to Production at X18 : added LED's for charge detect.	5-41452	6/9/00	CCF

FID1 FIDUCIAL

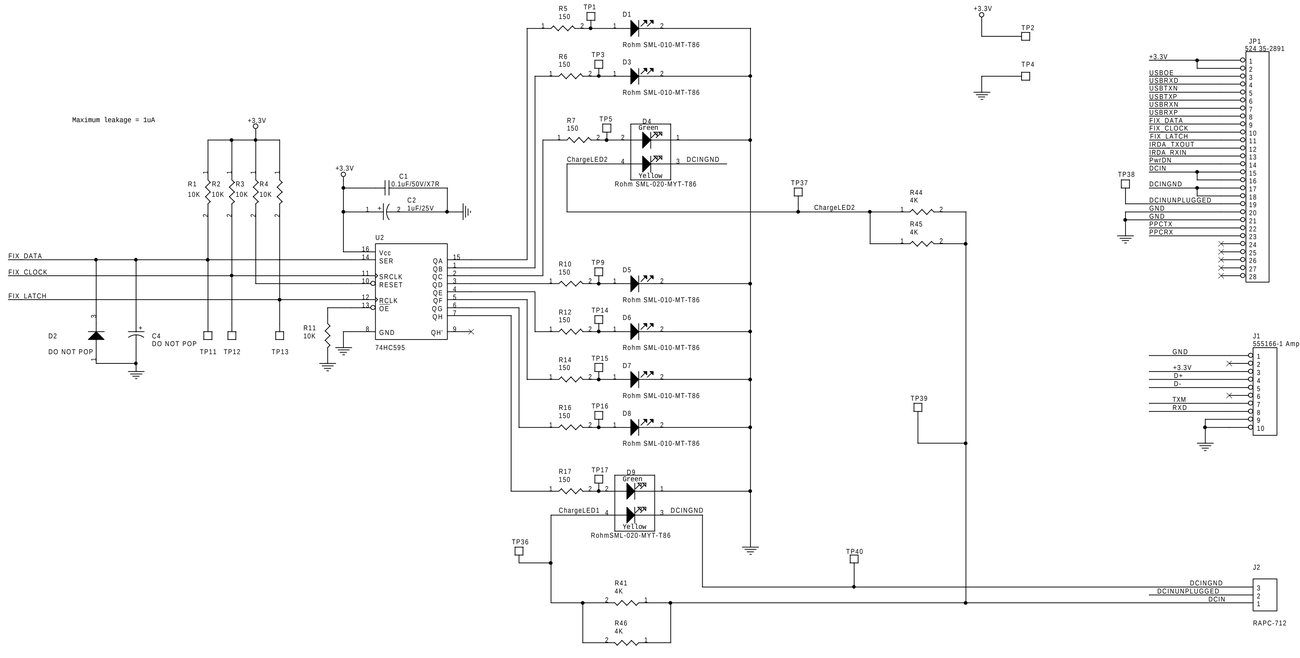
FID2 FIDUCIAL

FID3 FIDUCIAL

RS232

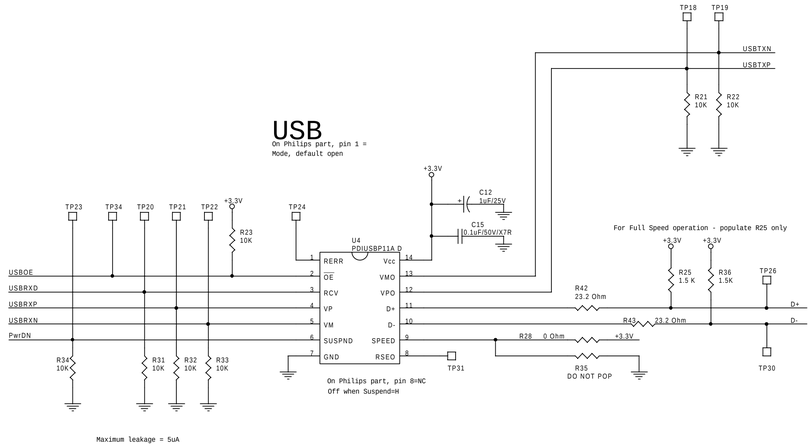


FIXATION LED'S

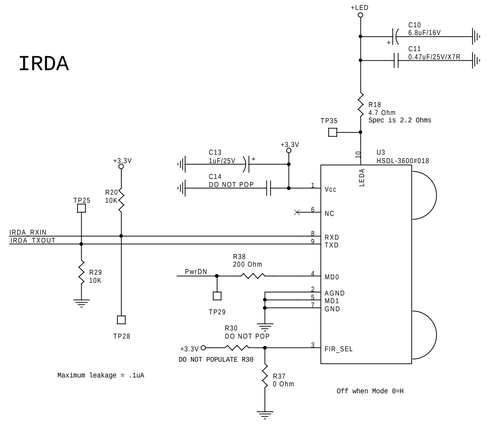


USB

On Philips part, pin 1 = Mode, default open



IRDA



Notes:

1. All values are shown for reference only. See BOM for proper values.
2. IRDA current limit set by R18 is lower then manufacturers recommended. This was found to substantially improve directional and distance performance.

Test Points - For Reference only.

TP2 = +3.3V
TP4 = GND

RS232
TP6 = V+ Charge Pump
TP7 = PPCRX
TP8 = V- Charge Pump
TP10 = PPCTX
TP32 = RXD
TP33 = TXM

Fixation LED's
TP1 = LED1
TP3 = LED3
TP5 = LED4
TP9 = LED5
TP11 = DATA
TP12 = CLOCK
TP13 = LATCH
TP14 = LED6
TP15 = LED7
TP16 = LED8
TP17 = LED9
TP36 = Chargeled1
TP37 = Chargeled2

USB
TP18 = USBTXN
TP19 = USBTXP
TP20 = USBRXD
TP21 = USBRXP
TP22 = USBRXN
TP23 = PwrDN
TP24 = RERR
TP26 = D+
TP30 = D-
TP31 = RSEO
TP34 = USBOE

IRDA
TP25 = TXD
TP27 = RXDSIR
TP28 = RXDFIR
TP29 = PWDWN
TP35 = +LED

DRAWN D.Fallat	DATE 02/26/2000	Title Fixation Display Driver Schematic	
APPROVED CCF	06/08/00		
RELEASED MKT	06/08/00	Size D	Document Number 140154 Rev A
ENGINEER CCF	PROJECT NO. RD14000	Date: Tuesday, June 27, 2000	Sheet 1 of 1

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REV	DESCRIPTION	ECN	DATE	APPROVAL
A	Release to Production at rev X9 : Added testpoints for D0-D7, TP34-TP41 Updated testpoint list on bottom of schematic Added testpoint to stdby TP33 and ID3 TP42	5-41452	6/9/00	CCF

TO CAMERA CONTROLLER

TIMING

CXD2434T

AMPLIFIER

CXA1690Q

CCD

ICX084

VERTICAL CLOCK

CXD1267AN

A/D

CXD2311AR

X9314WS-3

Do not populate R31 if U3 is populated. Only Populate U3 with the Xicor X9314WS-3 Part. DO NOT POPULATE with the Dallas DS1804

Check connections for VW VH VL Vcc

CONNECTOR-30

Serial ports internally pulled up

DO NOT POPULATE R21

Stdby

AD_CLOCK_5

Notes:

1. All values are shown for reference only. See BOM for proper values.
2. Supply integrity is extremely important on this board. Netnames on ground symbols vary. No changes should be made to allocation without rechecking.

Net Separators - nets are joined in copper

TEST POINTS - for reference only

TP1 - VIDEO_OUT - NEAR U1 PIN 7
TP2 - IM_REF_CLK_5
TP3 - AGCMAX
TP4 - CS
TP5 - U/D
TP6 - INC
TP7 - V3
TP8 - AGCCONT
TP9 - CCD_OUT
TP10 - H2
TP11 - H1
TP12 - IM_SER_DATA
TP13 - IM_SER_CLK
TP14 - IM_SER_STRB
TP15 - WEN5
TP17 - HORIZB_5
TP18 - VERTB_5
TP19 - SUB
TP20 - VRT
TP21 - DGND5
TP23 - +5_IMG
TP24 - -7.5V
TP25 - +15V
TP26 - +3.3V
TP27 - AGND
TP28 - Reset Gate
TP29 - V2
TP30 - V1
TP31 - VRB
TP32 - AD_CLOCK_5
TP33 - Stdby
TP34 - D1
TP35 - D3
TP36 - D5
TP37 - D7
TP38 - D0
TP39 - D2
TP40 - D4
TP41 - D6
TP42 - ID3

DRAWN D. Fallat	DATE 04/19/00		
APPROVED CCF	06/08/00	Title DAVE Camera Schematic	
RELEASED MKT	06/08/00	Size D	Document Number 140155 Rev A
ENGINEER CCF	PROJECT NO. RD14000	Date: Tuesday, June 27, 2000	Sheet 1 of 1

REV	DESCRIPTION	ECN	DATE	APPROVAL
A	Release to Production at X10	5-41452	6/9/00	CCF

Place close to power pins of U4

C8 10uF/25V/TA, C9 10uF/25V/TA, C10 10uF/25V/TA, C11 10uF/25V/TA

C1 C2 C3 C4 C5 C6 C7 .1uF/50V/X7R

C17 C18 C19 C20 C21 C22 C23 .1uF/50V/X7R

U3 48.0000Mhz OSC — C32 .1uF/50V/X7R

C41 C42 C43 C44 C40 1uF/50V/X7R

R4 499 1% — TP1

U5 RESET — 34164

R7 4.22K 1%

C45 10uF/16V/TA, C46 1uF/50V/X7R, C47 390pF/100V/NPO

Place as close as possible to Power PC

R8 R9 R10 R11 R12 R13 10K 47K

R24 10K

R25 R26 R27 20K — R28 R31 10K

LCD_GO, LCD_Right, LCD_Left, LoBatt_Warning, LoBatt_DEAD, DIPSW2, DIPSW0, DIPSW1

LCD_D7 LCD_D6 LCD_D5 LCD_D4 LCD_D3 LCD_D2 LCD_D1 LCD_D0 LCD_/RE LCD_SB LCD_/WE LCD_/CS

Fix_Latch, Fix_Clock, Fix_Data, USB_RXP, USB_RXN, Blanking

USB_TXP, USB_TXN, Dist_Echo, Spkr_CS

DMA_REQ1

To maintain power during BDM, TRIG_A's test point must be pulled high (3.3V).

R33 47K — R34 100 — TP3 FRZ — TP4

TP6 SRESETb, TP7 DSCK, TP9 HRESETb, TP10 DSDI, TP11

J1 Debug — R37 1K, R38 1K

BDM PINOUT
1 - FRZ or VFLS0 (TP10)
2 - SRESETb (TP9)
3 - GND (TP5)
4 - DSCK (TP11)
5 - GND (TP5)
6 - FRZ or VFLS1 (TP8)
7 - HRESETb (TP7)
8 - DSDI (TP12)
9 - Pull to +3.3V with 100 Ohms. (TP56)
10 - DSDO (TP13)

U4 MPC823

D12_CS0 ROM_CSb, A14_CS1 DRAM_CS5, B14_CS2 FPGA_Csb, A15_CS3 RTC_Csb, B16_CS4, D13_CS5, C14_CS6/CE1_B, B15_CS7/CE2_B

T7 T7 Vddl, J16 J16 Vddl, A7 A7 Vddl, G1 G1 Vddl, A3 A3 KAPWR, B1 B1_VDDSYN, A6 A6_EXTCLK, A5 A5_EXTAL, A4 A4_XTAL, B2 B2_XFC, A1 A1 Vsssyn, A2 A2 Vsssyn1 ??????

B3 B3_PORESET, B5 B5_HRESET, C5 C5_RSTCONF, N1 N1_IRQ0, N2 N2_IRQ1, D9 D9_RSV/IRQ2, C3 C3_DP0/IRQ3, D4 D4_DP1/IRQ4, C2 D3_DP2/IRQ5, N3 N3_IRQ7

F16 A31 … M13 A13 (LSB … MSB)

E3 D31 … M1 Data0 (LSB … MSB)

??????? C13_RD/WR — C13 RD/WRb

D16 WE0/BS_AB0/IORD, E16 WE1/BS_AB1/IOWR, D15 WE2/BS_AB2/PCOE, F13 WE3/BS_AB3/PCWE

E13_GPL_A0/GPL_B0, C16_OE/GPL_A1/GPL_B1, C15_GPL_A2/GPL_B2/CS2, D14_GPL_A3/GPL_B3/CS3, C12_GPL_A5

C16 OEb

D10_TS A12_TA C11_TEA — TSb, TAb, TEAb

B10_BURST, B12_BI, A13_BDIP/GPL_B5

C10_BG A11_BB — BGb, BBb

E15_TSIZ0, E15_TSIZ1/REG

P16_PA15/USBRXD R15_PA14/USBOE R14_PA13/IRXD2 R13_PA12/TXD2 — USB_RXD, USB_OE, IRDA_RXD, IRDA_TXD

N10_PA9/L1TXDA/SMRXD2, T9_PA8/L1RXDA/SMTXD2, T8_PA7/CLK1/TIN1/L1RCLKA/BRGO1, P8_PA6/CLK2/IBRGCLK1/ITOUT1, T6_PA5/CLK3/TIN2/L1TCLKA/BRGO2, R6_PA4/CLK4/BRGCLK2/TOUT2 — Power_MCU, Power_Fix, Disable_WEN, DIPSW4

N14_PB31/SPISEL/LCD_A, P15_PB30/SPICLK, P14_PB29/SPIMOSI, T15_PB28/SPIMISO, T14_PB27/BRGO1/I2CSDA, P12_PB26/BRGO2/I2CSCL, N11_PB25/SMTXD1, T11_PB24/SMTRXD1, T10_PB23/SMSYN1/SDACK1, R9_PB22/SMSYN2/SDACK2 — Im_Ser_Str_3, Im_Ser_CLK_3, Dist_Xmit, Im_Ser_Data_3, Laser_CS, Cam_CS, RS232_TXD, RS232_RXD, SDACK1, Laser_Inc

R7_PB19/L1ST1/LCD_B, P7_PB18/L1ST2/RTS2, N7_PB17/L1ST3/LCD_3, R5_PB16/L1ST4/L1RQA — Laser_ON/OFF, LED_ON/OFF, Laser_U/D, ToneEN

??????? B7_KR/RETRY/IRQ4/SPKROUT, D5_TEXP — D1_CLKOUT, R36 47K

R173 47K — TP43 — +3.3VFIL

R32 47K — +3.3VFIL

R177 10K, R99 10K, R174 10K — +3.3VFIL

TP45 TP46 TP32 DIPSW3

F9 Vss … L11 Vss

FID1 FIDUCIAL, FID2 FIDUCIAL, FID3 FIDUCIAL

U1 ASIC / G2_FPGA 10416-01 / 10178-01

VCCA 84, Vpp 64, VCCA 43, VSV 23 — +5V

VCCI 65, VCCI 22 — +3.3VFIL

CCD_Ref_CLK 82 — CCD_Ref_CLK_3

IRQ1b — VDb 25 VERTb_3, HDb 16 HORIZb_3

A/D_D0 44, A/D_D1 35, A/D_D2 40, A/D_D3 45, A/D_D4 38, A/D_D5 42, A/D_D6 47, A/D_D7 41

WEN_5 — TP37 — WENb 46

FPGA_Csb 20 — FPGA_Csb

TAb 75 — TA

DMA_SYNC_ACK1 50

OSC 83 — HCLK

RESET 66

GND 70, LP 63, GND 49, GND 28, MODE 12, GND 6

R6 10K — DMA_REQ1 61 — TP39

R15 10K — SDACK1

R17 1K, R18 1K — SRESETb, HRESETb — TP38

DMA[0:31]

Bypass Caps for FPGA

C24 C25 C26 C27 C28 C29 C30 C31 C33 C34 C35 C36 C37 .1uF/50V/X7R

U6 29LV400/800_TSOP TSOP48

A30 25, A29 24, A28 23, A27 22, A26 21, A25 20, A24 19, A23 18, A22 8, A21 7, A20 6, A19 5, A18 4, A17 3, A16 2, A15 1, A14 48, A13 17, A18/NC 16

D0 29 … D15 43 (LSB … MSB)

Intel_Vpp 13, Vcc 37

BYTE 47 — RDY/BSY 15 — Intel_WP 14 — RESET 12 — OEb 26 — WEb 11 — HRESETb 12 — GND 27, GND 46

R35 10K

ROM_CSb 28

Note:PowerPC Bit Significance
A31/Data31 - Least
A0/Data0 - Most

U7 MT4LC1M16E5TG-6 — U8 MT4LC1M16E5TG-6

A0 21 … A9 30; D0 2 … D15 49 (LSB … MSB)

Vcc 1, 6, 25; GND 26, 45, 50

DRAM_CSb 18 — RAS 35, CASL 34, CASH 33, OE 17, WE

DATA[0:31]

R107 2.0K, R109 2.0K, R111 2.0K, R115 2.0K, R117 2.0K — Data1, Data4, Data7, Data9, Data10

U4 pin 213 was pulled up and U4 pin 191 was pulled down to reflect changes made to the green board. This is not the same as the 2D scanner final design.

Changed Spkr/Beep to Speaker to match fixation PCB

DRAWN	E. Dickman	DATE	03/25/99
APPROVED	CCF		6/9/00
RELEASED	MKT		6/9/00
ENGINEER	CCF	PROJECT NO.	RD14000

Title: DAVE DSP/MCU Schematic

Size: Document Number 140156 — Rev A

Date: Tuesday, June 27, 2000 — Sheet 1 of 2

REV	DESCRIPTION	ECN	DATE	APPROVAL
A	Release to Production at X10	5-41452	6/9/00	CCF

FID4 FIDUCIAL
FID5 FIDUCIAL
FID6 FIDUCIAL

+3.3VFIL
TP14
GND

+VBATT
TP19
R93 1K
R94 1K
R95 1K
R125 1K
R126 1K
R127 1K
K1
K2
K3
Q1 MMBT4403
Q2 MMBT4403
Q3 MMBT4403
C60 .1uF/50V/X7R
C61 .1uF/50V/X7R
C62 .1uF/50V/X7R
TP36
R128 4.22K
R129 1K
Q4 MMBT4401
C63 .1uF/50V/X7R
R178 47K
TP20
ON
TP24
MCU_ON
Power_MCU
R130 1K
R131 10K
Q5 MMBT4401

-7.5V
C49 .1uF/50V/X7R
C50 1uF/25V/TAJ 16v
Place Close to Imager Connector Pin 1

+15V
C51 .1uF/50V/X7R
C52 1uF/25V/TAJ 35v
Place Close to Imager Connector Pin 2

+5V
C53 1uF/50V/X7R
C54 1uF/25V/TAJ 10v
Place Close to Imager Connector Pin 1

+3.3VFIL
TP13
C58 .1uF/50V/X7R
C59 10uF/35V/TAJ 6.3v
Place Close to Power Connector pin 9

+5V
TP12
C56 1uF/50V/X7R
C57 10uF/35V/TAJ 10v
Place Close to Power Connector

From Imager Board

Imager Connector

J2
GND
HORIZb_5
Im_Ref_CLK_5
VERTb_5
TP25
Im_Ser_CLK_5
IM_Ser_Data_5
WEN_5
Im_Ser_Strb_5
Cam_CS
Cam_Stdby
U/D
INC
+15V
-7.5V
+5V
ID3
AD_Clk(Return)
Molex 71220-1000

+3.3VFIL
R166 100K
R165 100K
R164 100K
R163 100K
D1_3
D2_3
D3_3
D0_3
D4_3
D5_3
D6_3
D7_3
R169 100K
R170 100K
R168 100K
R167 100K

+3.3VFIL
R43 47K
R44 47K
R45 1K
R46 1K
R47 10K
R48 10K
RD/WRb
TSb
TAb
TEAb
BBb
BGb
RD/WRb
TSb
TAb
TEAb
BBb
BGb

+3.3VFIL
TP21
TP22
TP23
K1
K2
K3
Q7 MMBT4403
Q8 MMBT4403
Q6 MMBT4403
R133 1K
R134 1K
R132 1K
TP33
TP34
TP35
LCD_LEFT
LCD_RIGHT
LCD_GO
R136 47K
R137 47K
R135 47K
PB1
SW PUSHBUTTON
Pushbutton allows the unit to be powered up without attaching LCD.

Connect to disable WEN
TP31
TP26
+5V
R176 10K
Cam_Stdby
Q9 MMBT4401
R171 1K
R172 10K
Disable_WEN

+3.3VFIL
R179 1K
D1
Rohm SML-010-MT-T86
To tell when the 3.3v supply is up.

Port Pins must be configured for Wired-Or mode to meet the +5 Volt requirement of these signals.
+5V
R71 1K
R72 1K
R73 1K
Im_Ser_Str_3
Im_Ser_Data_3
Im_Ser_CLK_3
R96 0 Ohm Im_Ser_Strb_5
R97 0 Ohm Im_Ser_DATA_5
R98 0 Ohm Im_Ser_CLK_5

If ASIC - Populate Jumpers Remove U10.
If FPGA - Remove jumpers, Populate U10.
R39 0
R41 0
DO NOT POPULATE R39, R41, R58
+5V
C55 .1uF/50V/X7R
R58 0
CCD_Ref_CLK
VERTb_3
HORIZb_3
U9
74ACT244 SSOP20
Im_Ref_CLK_5
VERTb_5
HORIZb_5

A[13..31]
U99 M48T37V
DATA[0:31]
RESET
WE0
RTC_Csb
+3.3V

Xicor X9314 CS is active low
From Laser Board
+5V
JP2
LASER_CS
R143 10k
LASER_Inc
LASER_UID
LASER_ON/OFF
LED_ON/OFF
+3.3V
Molex 52746-0890

From Power Supply and Distance Board
+3.3VFIL
J3
+15V
-7.5V
+5V
+VBATT
ON
TP40
LoBatt_DEAD
LoBatt_Warning
Dist_Xmit
Blanking
Dist_Echo
LBO
LBW
XMIT
BLANKING
LOGIC_ECHO
ToneEN
ToneINC
ToneCS
ToneUID
DCIN
DCINGND
DCINUNPLUGGED
BATT_GND
GND
52435-3091
Main Trigger = L= ON
Camtrig H=Off

R144 0 Ohm
LCD_VSS
GND3
LCD_BUTTON_GND
R145 0 Ohm

From LCD
+3.3V +3.3VFIL +3.3
LCD_DIP_GND LCD_VSS LCD_BUTTON_GND
+3.3V +3.3V +3.3V +3.3V
R162 100K
R161 100K
R158 100K
R157 100K
TP18 TP17 TP16 TP15
LCD_D0
LCD_D1
LCD_D2
LCD_D3
LCD_D4
LCD_D5
LCD_D6
LCD_D7
JP5
LCD_VSS
+3.3V
LCD_SB
LCD_/RE
LCD_/WE
LCD_/CS
LCD_BUTTON_GND
R155 100K
R156 100K
R159 100K
R160 100K
TP27 TP28 TP29 TP30
+3.3V
R147 47K
R148 47K
R149 47K
R151 47K
R153 47K
R146 47K
R150 47K
R152 47K
DIP_D0
DIP_D1
DIP_D2
DIP_D3
DIP_D4
DIP_D5
DIP_D6
DIP_D7
LCD_DIP_GND
DIPSW0
DIPSW1
DIPSW2
DIPSW3
DIPSW4
R180 0
R181 0
Molex 52437-3091

From Fixation Board
JP4
+3.3VFIL
USB_OE
USB_RXD
USB_TXN
USB_TXP
USB_RXN
USB_RXP
Fix_Data
Fix_Clock
Fix_Latch
IRDA_TXD
IRDA_RXD
R175 0 Ohm
Power_Fix
DCIN
DCINGND
DCINUNPLUGGED
BATT_GND
PPCTX
PPCRX
GND
RS232_TXD
RS232_RXD
Molex 52435-2891

Notes:
1. All values are shown for reference only. See BOM for proper values.
2. Text notes from 2D design are maintained for reference only.

DRAWN	E. Dickman	DATE	03/25/99
APPROVED	CCF		6/9/00
RELEASED	MKT		6/9/00
ENGINEER	CCF	PROJECT NO.	RD14000

File: DAVE DSP/MCU Schematic
Size: D | Document Number: 140156 | Rev: A
Date: Tuesday, June 27, 2000 | Sheet 2 of 2

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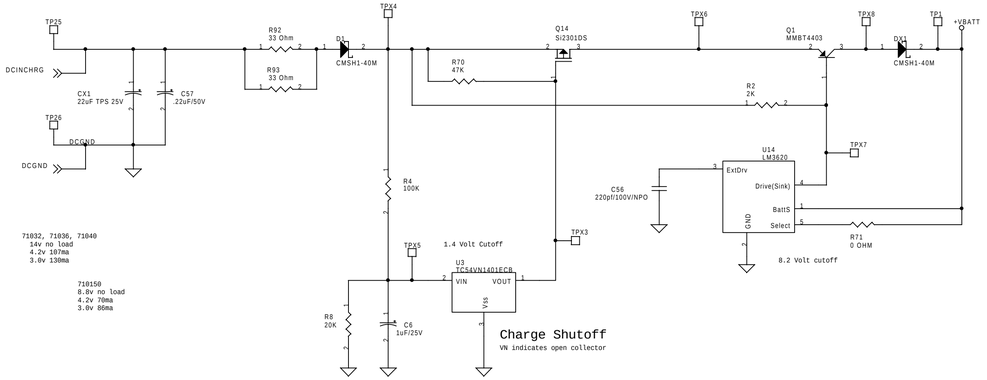
THE SALE OF EQUIPMENT OR DEVICES, WITHOUT WRITTEN PERMISSION OF WELCH ALLYN, INC.

REV	DESCRIPTION	ECN	DATE	APPROVAL
A	Release to Production at X10	5-41452	6/9/00	CCF

Charging Control

7.9v regulator

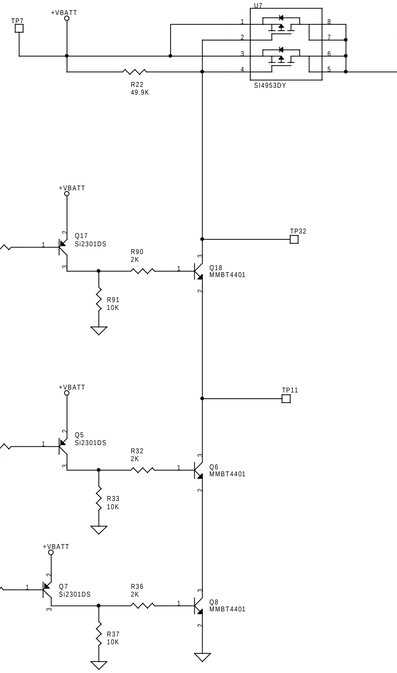


71032, 71036, 71040
14v no load
4.2v 107ma
3.0v 130ma

710150
8.8v no load
4.2v 70ma
3.0v 86ma

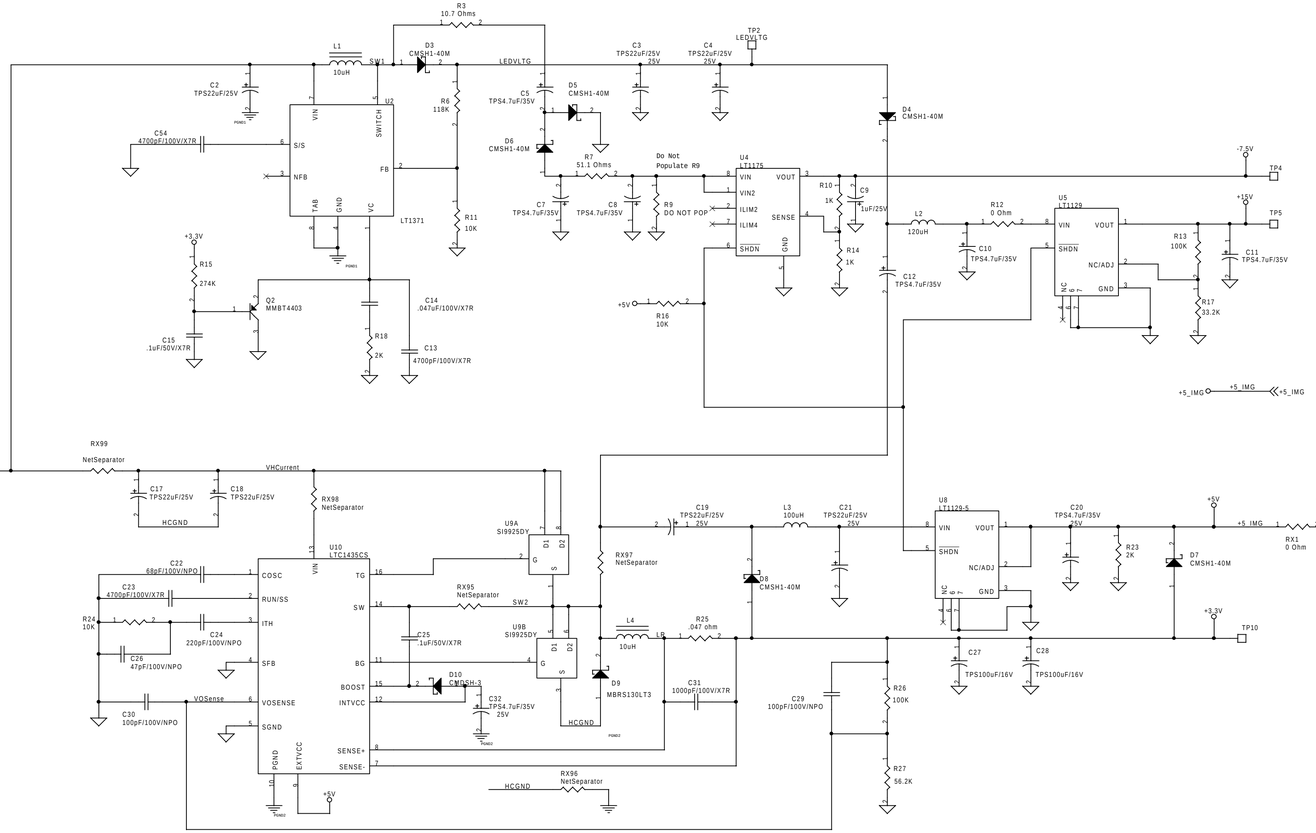
FID1 FIDUCIAL
FID2 FIDUCIAL
FID3 FIDUCIAL
FID4 FIDUCIAL

TRIGGER/POWER CIRCUIT

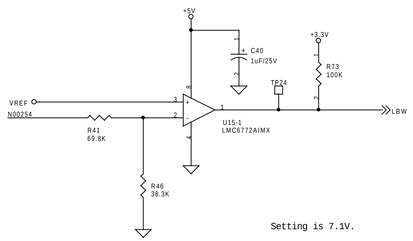


Notes:

1. All values are reference only.
   For actual part values please see BOM.
2. Test Point Cross Reference
   TP1 - VIEW_ON/OFF
   TP2 - LED
   TP3 - DD Current
   TP4 - GND
   TP5 - VDD
   TP6 - VSET
   TP7 - Laser CS
   TP8 - LASER U/D
   TP9 - LASER INC
   TP10 - LD Cathode
   TP11 - VIEW_ON/OFF
   TP12 - DD Voltage
   TP13 - VREF
3. Netnames on ground symbols vary. All supplies are passed to and from DSP. Allocation should not be changed without rechecking.

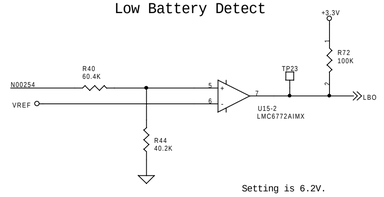


Low Battery Warning



Setting is 7.1V.

Low Battery Detect



Setting is 6.2V.

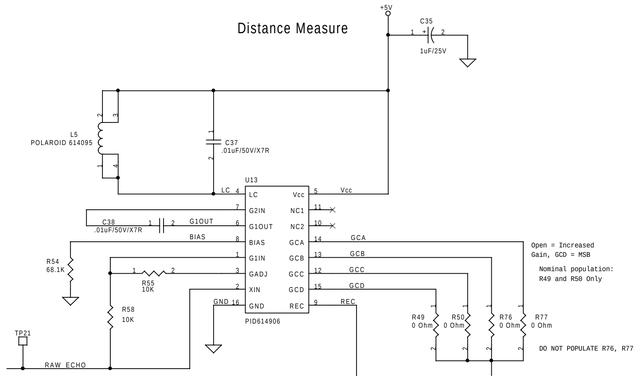
RX's are temporary net separators

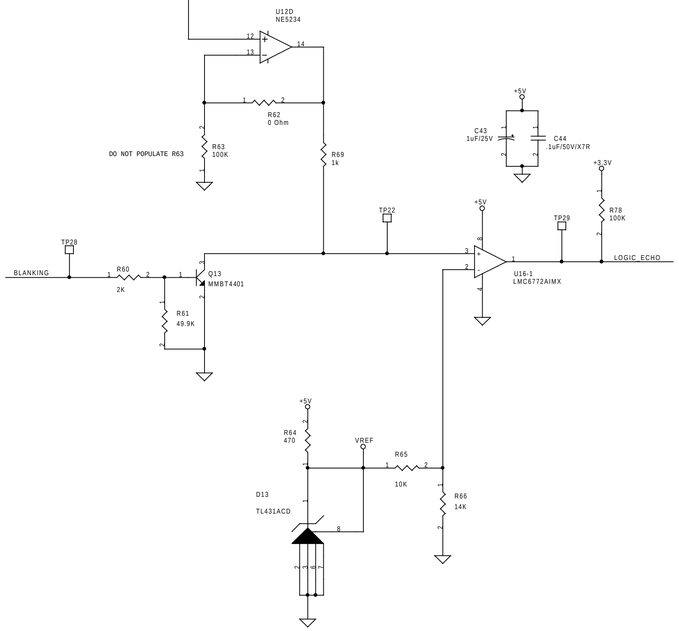
All these individual gnd nets are all connected at a single point on the actual board. This is just to reference that. Originally, resistors were used as net separators.

DRAWN	DATE	WELCH ALLYN INC.	
E. Dickman	03/25/99	MEDICAL DIVISION SKANEATELES FALLS, NY USA	
APPROVED	6/9/00		
CCF		Title	
RELEASED	6/9/00	Power and Distance Board	
MKT		Size D	Document Number 140157 Rev A
ENGINEER	PROJECT NO.	Date: Tuesday, June 27, 2000	Sheet 1 of 2
CCF	RD14000		

REV	DESCRIPTION	ECN	DATE	APPROVAL
A	Release to Production at X10: made provision for 100 step pot	5-41452	6/9/00	CCF

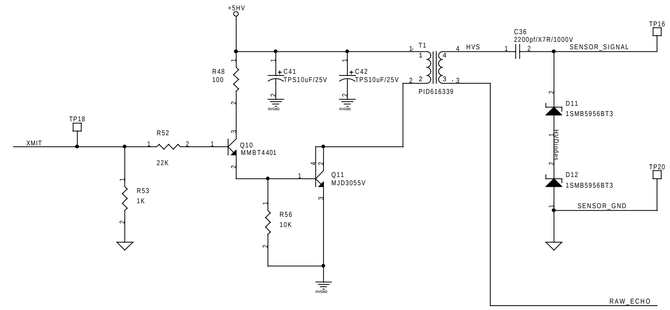
Distance Measure

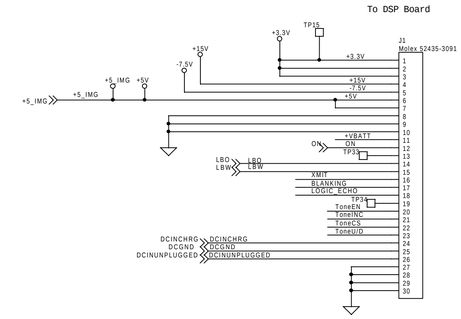


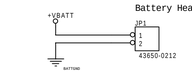


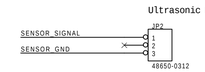
T1p4 is the HV output pin

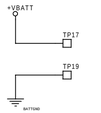
D12 may be optionally SC

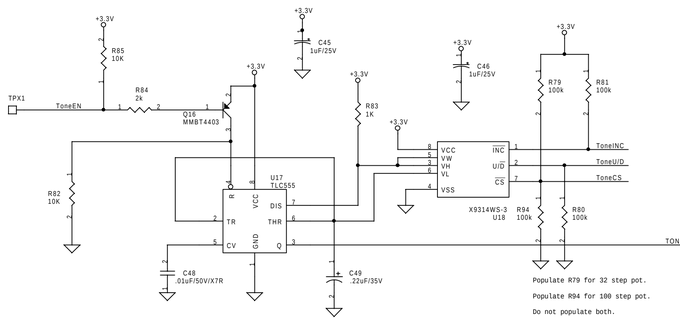




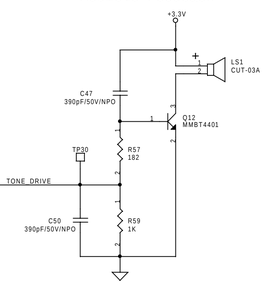








Audible Feedback

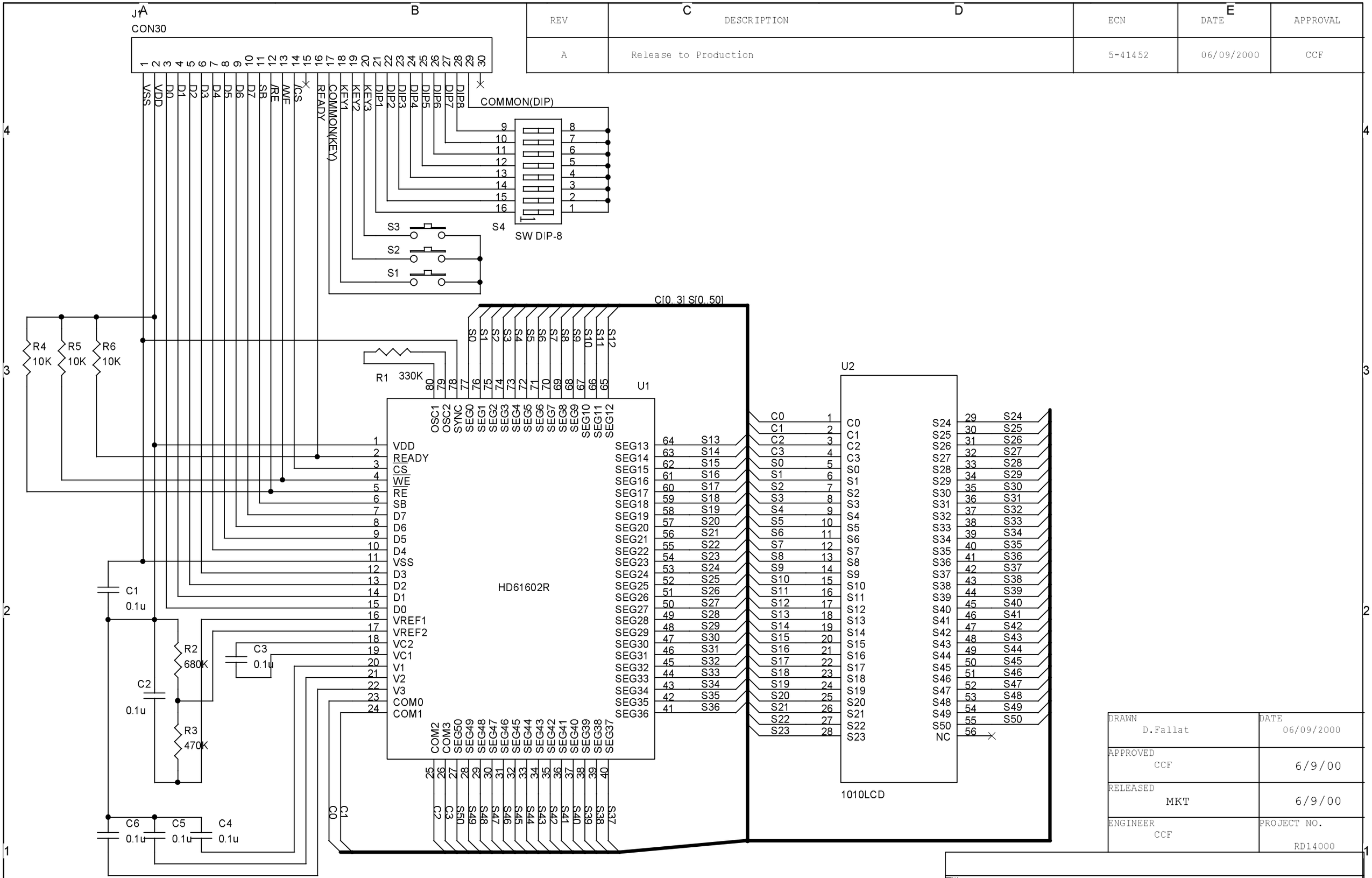


Notes:

1. All values are reference only. For actual part values please see BOM.
2. Test Point Cross Reference
   - TP1 - VIEW_ON/OFF
   - TP2 - LED
   - TP3 - PD Current
   - TP4 - GND
   - TP5 - L_VDD
   - TP6 - VSET
   - TP7 - LASER_CS
   - TP8 - LASER_U/D
   - TP9 - LASER_INC
   - TP10 - LD Cathode
   - TP11 - LASER_ON/OFF
   - TP12 - PD Voltage
   - TP13 - VREF
3. Netnames on ground symbols vary. All supplies are passed to and from DSP. Allocation should not be changed without rechecking.

DRAWN: David Fallat	DATE: 04/25/00		
APPROVED: CCF	06/09/00		
RELEASED: MKT	06/09/00		
ENGINEER: CCF	PROJECT NO.: RD14000	Title: Power and Distance Schematic	
		Size: D	Document Number: 140157 Rev: A
		Date: Tuesday, June 27, 2000	Sheet 2 of 2

REV	DESCRIPTION	ECN	DATE	APPROVAL
A	Release to Production	5-41452	06/09/2000	CCF


J1
CON30
VSS VDD D0 D1 D2 D3 D4 D5 D6 D7 SB /RE /WE /CS READY COMMON(KEY) KEY1 KEY2 KEY3 DIP1 DIP2 DIP3 DIP4 DIP5 DIP6 DIP7 DIP8
COMMON(DIP)
S4
SW DIP-8
S3
S2
S1
C[0..3] S[0..50]
R1 330K
R4 10K
R5 10K
R6 10K
U1
HD61602R
OSC1 OSC2 SYNC SEG0 SEG1 SEG2 SEG3 SEG4 SEG5 SEG6 SEG7 SEG8 SEG9 SEG10 SEG11 SEG12
VDD READY CS WE RE SB D7 D6 D5 D4 VSS D3 D2 D1 D0 VREF1 VREF2 VC2 VC1 V1 V2 V3 COM0 COM1
SEG13 SEG14 SEG15 SEG16 SEG17 SEG18 SEG19 SEG20 SEG21 SEG22 SEG23 SEG24 SEG25 SEG26 SEG27 SEG28 SEG29 SEG30 SEG31 SEG32 SEG33 SEG34 SEG35 SEG36
COM2 COM3 SEG50 SEG49 SEG48 SEG47 SEG46 SEG45 SEG44 SEG43 SEG42 SEG41 SEG40 SEG39 SEG38 SEG37
U2
1010LCD
C0 C1 C2 C3 S0 S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 S13 S14 S15 S16 S17 S18 S19 S20 S21 S22 S23
S24 S25 S26 S27 S28 S29 S30 S31 S32 S33 S34 S35 S36 S37 S38 S39 S40 S41 S42 S43 S44 S45 S46 S47 S48 S49 S50 NC
C1 0.1u
C2 0.1u
C3 0.1u
C4 0.1u
C5 0.1u
C6 0.1u
R2 680K
R3 470K

1. All values are for reference only
2. FEMA reference internal number UMS-1010AN (ref)

DRAWN D.Fallat	DATE 06/09/2000
APPROVED CCF	6/9/00
RELEASED MKT	6/9/00
ENGINEER CCF	PROJECT NO. RD14000

Title: DAVE LCD Schematic		
Size	Document Number 140158	Rev A
Date: Tuesday, June 27, 2000	Sheet 1 of 1	

PAGE 1 OF 4	SIZE	DRAWING NUMBER	REV
	A	A04262	A

PROCESS SHEET FOR:

SureSight

Revision Logs

DRAWN: C. Fahrenkrug	DATE: 05/05/00
APPROVED: RA	DATE: 05/08/00
REL TO PROD: GR Waclena	DATE: 05/15/00

REV	REV DESCRIPTION	ECN #	INIT	DATE	APPR
A	Release to Production	5-41366	CCF	7/10/2000	RA

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GENERAL

These revision logs are maintained for reference, and do not contain every single change which has been made to this product. It is intended to provide a list of major changes which are relevant to the repair and troubleshooting of units. Any critical product traceability should be done through the Welch Allyn ECR documentation.

Unless otherwise specified:

- All changes refer to both eyecare and primary care units. S/N's for each model are given in the S/N log.
- S/N's and Dates refer to best estimate of implementation. Units which are very close to this transition may or may not have been run to the new change and should be checked for compliance. An estimate of 2 weeks, or 20 units would be an expected potential overlap.
- It is the judgment of the ECR originator through the ECR process to determine if a change merits inclusion on this list. Changes may also be added after the ECR as long as the relevant dates and S/N's are supplied.
- Changes are noted under each category that they impact. Most will occur in at least two categories.

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Table 1: Serial Number Revision Log

S/N Cut-Ins	Description of Changes	Recommended Upgrades
14001 ~S# 9900001 14011 ~S# 9920001	Initial Release	
14001 ~S# 9900480 14011 ~S# 9920086	Power board charge current increased.Increased to allow international charging (220V) and use of unit in Japan (100V). This increases domestic to approximately a 9 hour charge.	Change of power board is optional.
14001~S# 9900395 14011~S# 9920000	Units do not have o-ring assembled in front insert assembly.	Remove O-ring. Replace distance wire assembly if it is disconnected from the contact sensor at anytime.
14001~S# 9900604 14011~S# 9920287	Anti-reverse battery insertion compartment	Replace battery compartment.
14001~S# 0000094 14011~S# 0020222	New Battery Compartment Retainers. (with screw attachment)	Only if battery retainer is excessively loose - replace battery compartment.
14001~S# 0000018 14011~S# 0020093	New Tube Design - solid apertures.	Upgrade plate to new design.
14001~S# 0000007 14011~S# 00200043	Changed Patient window to harder coated version.	If window is excessively scratched-replace with new window.
14001~S# 14011~S# Future - S/N tbd.	Charge LED indicators added to fixation board.	Optional - upgrade if customer has charging related complaints.

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Table 2: Software Revision Log

Software Revision	New Features	Bug Fixes	Suggested Upgrade
1.01	• Initial Release	N/A	V 1.20
1.02	• None	• Changed camera initialization to prevent long delay in obtaining good images • For additional items, see corrective action list in VDD	V 1.20
1.04	• Added support to obtain the software version and current dip switch positions.	• Low battery signal no longer lost after depressing Adult/Child button. • Print out matches LCD	V 1.20
1.05	• None	• No axis printed out if cylinder equal to zero. • No sign is printed or displayed for zero sphere or cylinder.	V 1.20
1.06	• RS-232 EMR Interface	• None	V 1.20
1.07	• New auto-shutdown operation. Shut down occurs in 1 minute, with results saved in battery-backed RAM for recall at any later time. • FPGA BIT Test disabled	• None	V 1.20
1.09	• None	• Initialize pointers to patient and display patient records	V 1.20
1.14	• New image processing, adult zero and adult curvefit.	• None	V 1.20
1.15	• New adult cylinder curvefit	• None	V 1.20
1.16	• New USB SDK functions to disable distance measurements during tests.	• None	V 1.20
1.17	• Longer blanking time when taking distance measurements to try to prevent flaky distance problem. • Add event recording for calibration data updates.	• None	V 1.20
1.20	• Revised Adult Curvefit	• None	N/A

Notes:

1. These include .DLL and WA_Down changes.
2. Numbers not included above, were not released to production.
3. Shaded releases were for internal .DLL only and do not affect service.
4. Unless otherwise specified - all units should be upgraded to the current S/W version.

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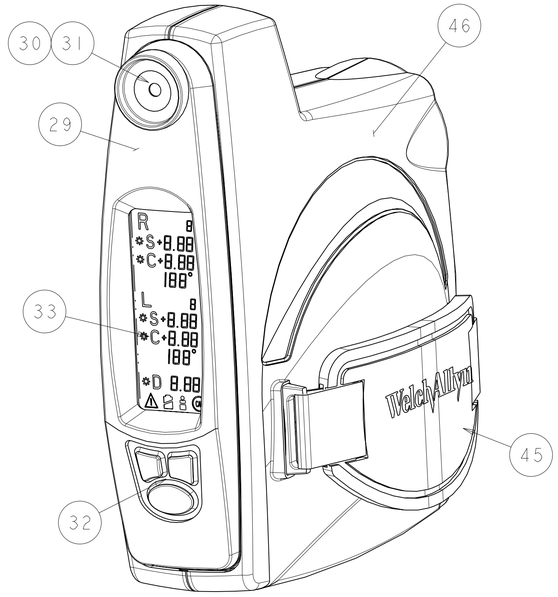
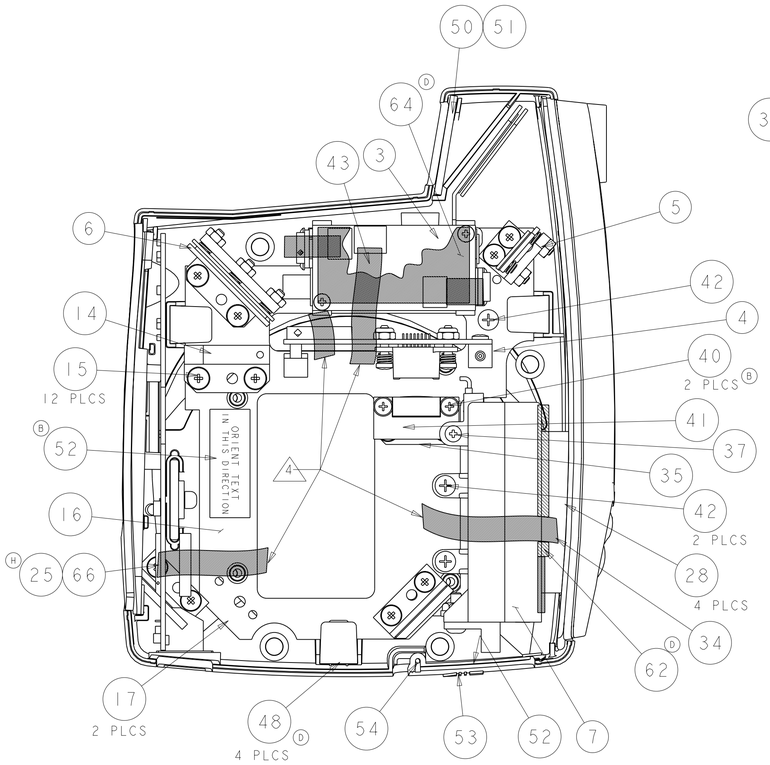
REV	DESCRIPTION	ECN/ECO	INIT	DATE	CKD
A	RELEASE TO PRODUCTION (X6+)	5-39368	JJO	4-14-99	CCF
B	REV'D TORQUES, ADDED 2 PLCS, 18, 59, 60, 61	5-39813	SB	6-23-99	CCF
C	REM'D ITEM 10	5-39942	SB	7-8-99	CCF
D	REM'D ITEM 55, ADDED 62, 63, 64 & ANOTHER 48	5-40095	SB	8-12-99	CCF
E	REM'D BALLOONS FOR ITEMS 8, 9, 12, 13	5-40171	SB	8-26-99	CCF
F	REM'D O-RING (ITEM 61)	5-40283	SB	9-17-99	CCF
G	REM'D 8 BALLOONS, ADDED 1	5-40661	SB	1-4-00	CCF
H	REM'D 6 BALLOONS, ADDED 1	5-40775	SB	1-24-00	CCF
J	REV'D TORQUE RANGE FOR ITEM 28, REM'D VALUE FOR ITEM 47	5-41419	SB	5-30-00	CCF



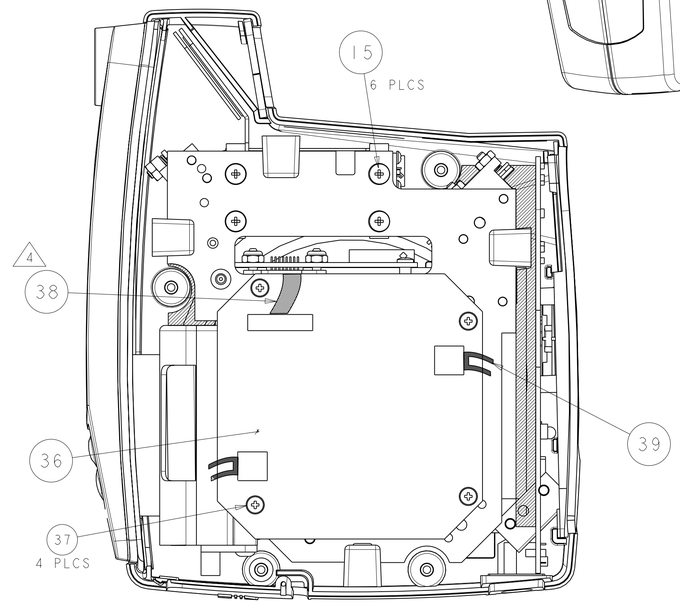


VIEW WITHOUT COVER, DSP BOARD (ITEM 44), SCREWS (ITEM 37 2 PLCS) OR LASER WARNING LABEL (ITEM 59) B

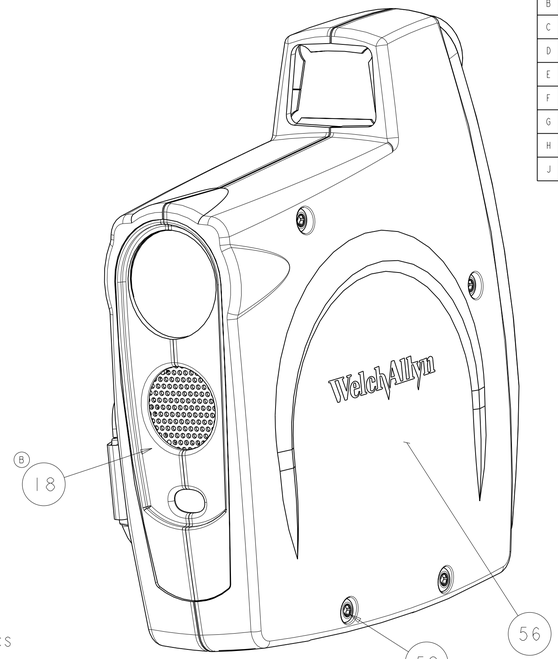
NOTES:

1. FOR TORQUE VALUES, REFER TO TABLE.
2. AT THE END OF MANUFACTURE AND PRIOR TO SHIPMENT: EACH UNIT MUST PASS THE FOLLOWING TESTS DETAILED ON THE MANUFACTURING A-SPEC:
   - -SOFTWARE (REVISON PER BOM)
   - -CALIBRATION
   - -FUNCTIONAL TEST
3. ANY CHANGE AFFECTING OPTICS FUNCTION MUST HAVE PRIOR APPROVAL OF WELCH ALLYN CORPORATE OPTICS GROUP.)

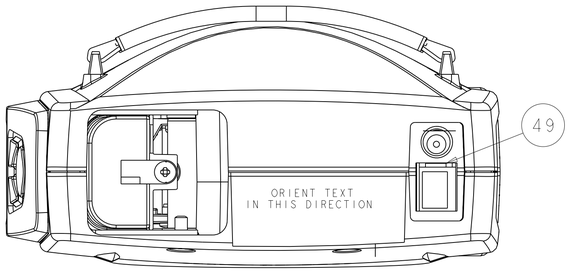
4. OTHER END OF FLEX CONNECTS TO DSP PCB ASSEMBLY (NOT SHOWN).



VIEW WITHOUT COVER



B	58	5.5 - 7.5
B	15, 42 (BATTERY WIRE ASS'Y)	3.5 - 4.5
J B	28	3.75 - 4.25
B		
B	37, 40, 42	1.5 - 2.0
	ITEM BUBBLE NUMBER	TORQUE RANGE IN INCH LBS.



VIEW WITH BATTERY DOOR REMOVED

THIS DWG - 501	SureSight, FINAL ASSEMBLY	
PART NO.	DESCRIPTION	
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DRAWN: S BUERKLE	DATE: 28-Aug-98	Welch Allyn®
APPROVED: MKT	DATE: 2-3-99	MATERIAL: N/A
REL TO PROD: MKT	DATE: 4-14-99	FINISH: N/A
-	-	TITLE: SureSight FINAL ASSEMBLY
CAD SOFTWARE:	PRO-E	
TRANSLATED FROM:	---	
UNLESS OTHERWISE SPECIFIED TOLERANCES DIMENSIONS ARE IN INCHES .XX ± .02 .XXX ± .005 ANGLES ±2°	D	DRAWING NO. 140000 REV J
	SCALE 1:1	SHEET 1 of 1